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THE INFLUENCE OF IMPROVEMENT IN ONE SIMPLE MENTAL PROCESS UPON OTHER RELATED PROCESSES.

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The problem to be solved in the transfer of training is no longer whether improvement in one function will be equally effective for all functions, nor whether improvement in one function is absolutely restricted to that function. It is, rather, to what extent training in one particular function will be effective for another particular function. The formulation of the laws of transfer can result only from amassing a large amount of concrete material, determined from a large number of individuals. To quote from Thorndike,[1] the experimental facts now at hand "are in a sense trivial in comparison with the very great variety of facts which must be measured in order to describe justly the spread of improvement in the work of the schools, trades, and the like."

A historical review of the investigations in transfer would be superfluous in this paper, since several authors have so recently covered the ground. The latest and the most noteworthy is Thorndike's[2] discussion of the influence of improvement and the extensive bibliography accompanying it.

[1] *Educational Psychology*, Vol. 11, p. 417, 1913.
[2] Loc. cit.

The present experiment, although intended mainly to add to the general fund of transfer studies, differs in several particulars from previous work. First, the training series was continued long enough to bring the curves of improvement practically to a level, before the transfer effect was tested. In the work of Ebert and Meumann, for instance, some of the training series occupied scarcely more time than the test series, that is, there was about as much chance for improvement directly in the test series as there was in the training series. Add to this the fact that they used no control subjects and the conclusions are not especially convincing.[3] This defect in transfer studies parallels that of discussing the effects of practice upon a group of individuals from curves which have simply passed beyond the point of most rapid fall. Hollingworth[4] has shown that the relations among a number of individuals at the end of practice is quite different from their relations after the point of rapid decline in the curve has been passed. Second, the possibility of transfer of the very general factors such as adaptation to the conditions of the experiment, acquaintance with the material, distribution of attention, etc., were eliminated as far as possible. In most of the transfer experiments, these factors make up the bulk of the transferred improvement, just as they cause the rapid fall in a short practice curve. These general factors were eliminated by selecting subjects who were familiar with psychological tests and who in most cases had had experience with the very tests used. In addition to this familiarity with the experiment, a more specific acquaintance with the material was obtained by considering the first two trials in the first and the last test series in the case of both the trained and the control groups as preliminary and not to be calculated in the results. If one is to be able to refer transfer of improvement to specific elements in the process or to the formation of definite bonds between situation and response, these general sources of improvement should be removed. However, one difficulty may seem to arise with this procedure, and that is that the amount of preliminary acquaintance with the tests will be unknown and will most likely differ among the subjects. But this difficulty is present to a certain extent in every

[3] For a discussion of the methods of Ebert and Meumann, see Thorndike, loc. cit.

[4] H. L. Hollingworth. *Correlation of Abilities as Affected by Practice*, J. of Ed. Psych., September, 1913.

practice curve because no individual starts at his zero point of efficiency in any of the functions that we can test. So in this, as in all other work of the kind, we do not attempt to remove this particular difficulty but to make allowance for it in our calculations. The indefinite starting point is especially troublesome in computing per cents. and averages. As there are so few subjects in the experiment, the tables that follow give results expressing improvement in absolute amounts together with the amounts of the initial performance in each test.

The general plan of the experiment was as follows: Eight subjects, and in some of the tests eleven, repeated each of a series of seven tests five times. Four of these subjects were then selected as a training group while the others became the control group. The training group was practised in each of another set of four tests for 100 times. This training continued for a period of nine days with approximately eleven tests each day. On the tenth day, the combined group of trained and control subjects was again tested in the seven tests used at the beginning of the experiment. Five trials were given as at the start. Hence, we may compare the performance of a group who had nine days of special training with a group which had no special training during this interval.

The tests taken by all of the subjects and which will be called the "test series" consisted of the Form Naming test, the Adjective-Noun test, the Number Group Checking test (in two parts), and the calculation tests, including Subtraction, Multiplication, and Division. The tests taken only by the training group and to be known as the "training series" consisted of the Color Naming test, the Opposites test, the Number Checking test, and the Addition test. These tests and the procedure will be described in detail later. All errors were announced by the experimenter and corrected immediately by the subject, except in the case of the Number Group Checking test. Here the errors were turned into time amounts by an arbitrary rule and these amounts added to the time for the test. All results are expressed in terms of the time required to do the whole test.

Table I gives the results of the "training series" for the four subjects, A, B, C, and D. The 100 trials are divided into twenty groups of five tests each. The figures given are the averages of these groups of five trials each, and are arranged in the horizontal

rows under the numbers from 1 to 20. An examination of these figures indicates that the Color Naming test shows the least gain. All of the subjects were familiar with this test, but it is one in which very little gain is possible even in the case of new subjects. For that reason it is a valuable test to use where one wishes to avoid complications due to practice effect. In this test, one subject lost 4.8 seconds as a result of the practice work. The average of the first five tests shows the fastest record of the whole series. Subjects who show this result seem to become confused after naming the colors several times and a kind of inhibition results. Introspection suggests quite strongly that this inhibition is not that of the processes by which the thought of the color is aroused but rather that of the speaking mechanism. In the case of all of the other tests, there was a gain, although in one or two instances it was quite small. In the Opposites test subject A has a high initial time and a very large gain compared with the other subjects. This subject was not as familiar as the other subjects with the particular form of the Opposites test, and his gain in the first few tests was rather rapid.

TABLE I.

Results of the Training Series.

(The 100 separate trials are divided into groups of five each. Each figure in the table represents the average of five trials. These averages are arranged in horizontal rows under the numbers 1 to 20.)

Subject	1	2	3	4	5	6	7	8	9	10
					Color Naming.					
A	43.6	45.0	42.6	42.0	42.0	45.2	41.4	40.4	41.2	40.4
B	38.4	42.2	36.6	43.4	40.6	43.6	37.4	37.4	41.2	39.2
C	45.8	51.0	45.8	49.8	44.0	48.6	48.0	54.2	50.2	46.4
D	31.4	34.0	36.0	34.6	34.0	38.0	38.0	39.4	35.0	37.4
					Opposites.					
A	90.4	74.2	50.0	48.6	45.2	45.2	40.2	42.0	38.0	40.0
B	31.6	31.2	33.8	31.2	35.4	31.2	37.8	32.2	31.0	32.8
C	24.6	25.2	24.4	25.0	23.2	24.6	25.4	23.8	28.4	23.8
D	29.6	27.6	26.8	24.6	25.0	24.6	23.2	25.0	24.6	25.0
					Cancellation.					
A	68.0	66.0	58.6	50.2	49.8	49.8	43.8	45.4	45.4	45.4
B	60.4	54.6	54.6	51.0	49.0	53.0	50.0	49.4	47.0	48.4
C	60.0	60.0	56.4	54.0	55.0	50.4	56.2	59.6	50.6	51.0
D	75.0	77.4	72.8	59.6	59.8	60.8	56.2	57.2	57.6	53.0
					Addition.					
A	109.2	108.0	89.0	83.6	84.6	73.4	66.2	63.2	69.8	59.8
B	95.2	83.4	77.4	76.6	69.6	78.8	79.4	66.0	61.0	61.8
C	110.0	86.6	84.0	85.4	81.8	78.6	72.2	60.2	63.0	59.0
D	242.0	196.4	110.0	91.8	81.6	70.6	67.6	63.2	66.0	63.4

TABLE I (Continued).

Results of the Training Series.

Color Naming.

Subject	11	12	13	14	15	16	17	18	19	20
A.....	38.2	39.8	40.0	42.8	39.6	39.0	39.2	40.4	40.8	38.6
B.....	37.2	34.0	36.0	34.8	37.0	38.0	35.8	37.6	36.2	37.4
C.....	52.4	44.6	44.0	44.0	45.0	47.0	39.4	44.8	50.0	43.4
D.....	34.8	36.0	34.4	38.6	35.8	35.6	34.0	36.4	35.8	36.2
					Opposites.					
A.....	34.8	35.8	34.0	35.2	36.4	36.6	34.2	34.8	34.0	32.6
B.....	28.4	30.4	29.2	30.4	28.4	28.2	25.4	30.6	29.0	28.5
C.....	25.4	23.0	25.2	24.4	22.6	24.0	22.4	21.2	22.0	20.6
D.....	23.4	24.0	23.2	23.8	23.8	24.0	23.8	22.8	20.2	23.1
					Cancellation.					
A.....	41.4	40.6	42.4	42.4	42.6	41.0	40.0	40.8	40.2	38.0
B.....	49.8	44.0	43.0	44.8	44.0	43.4	45.8	42.2	42.0	39.4
C.....	49.8	43.8	46.0	50.4	40.4	46.8	49.6	45.0	47.0	44.1
D.....	51.8	56.0	53.6	51.2	50.6	57.6	54.2	54.0	51.6	52.5
					Addition.					
A.....	61.6	59.6	59.6	57.6	57.6	58.8	54.2	54.2	59.2	56.8
B.....	61.0	53.4	54.8	50.2	57.0	51.8	54.8	57.2	49.8	60.0
C.....	59.0	55.0	54.0	52.6	52.0	50.2	52.0	50.4	51.2	48.6
D.....	59.6	53.2	58.8	52.4	52.0	52.2	50.6	49.2	54.2	51.2

I. Influence of Training in the Color Naming Test upon Ability in the Form Naming Test.

The first problem is the influence of the training in the Color Naming test upon the ability in the Form Naming test. The value of first eliminating from possibility of transfer all of the general bonds between the situations and responses becomes apparent when we take up the above problem. If we had not done so, the cross transfer among the different tests of the "test group" and the "training group" would leave us hopelessly confused. As the results will show later, the bonds between situation and response in this experiment are too specific to cause confusion by transfer among the tests not directly compared.

The Color Naming test consists in naming as rapidly as possible the five most familiar colors, red, blue, yellow, green, and black, each repeated twenty times. These colors are presented on a sheet, in the form of a square with ten colors on a side. At each trial the sheet is turned 90 degrees so that the same order is given every fourth time. The Form Naming test has an identical arrangement, the only difference being that five familiar forms, the star, square, circle, cross, and triangle, take the place

of the five colors. The procedure in both tests is the same. The difference is, then, one of content while the form remains the same. Two types of specific bonds or connections are possible here. First, the formation of connections between the particular arrangement of the objects to be named and the proper method of response. Under this head would be included: the largest number of objects that could be seen at one fixation of the eyes, how far one could safely look ahead, how fast one can speak the words without getting confused, and various other tricks which a subject may acquire. These connections appear to be the same in both cases. It is possible, however, that in case of the most economical speed, for example, there might be a difference between the two tests, so that one finally learns that he must speak the colors more slowly than the forms. Second, the formation of connections between the object seen and the name spoken—this is a direct bond, and differs in the two cases. Forming a bond between red and its name thought or spoken has no influence upon the strength of the bond between star and its name thought or spoken. It is easier perhaps to conceive that the one connection should inhibit the other, the response red by continual repetition might become so habitual that the wrong stimulus, a circle for instance, might tend to produce it. But theoretically one would expect no interference between the two kinds of specific bonds.

Table II gives the results of these tests. The table is divided into two main sections. The first represents the training series (Color Naming), the second represents the test series (Form Naming). The second section is divided into two further sections representing the test series for the trained group and that for the untrained or control group. In each of these divisions will be found the amount of the initial performance and the gross gain. In all cases the initial performance is the average of the last three of the five tests in the first series. The final performance from which the gross gain is calculated is the average of the last three of the five tests in the final series. In the training series, the initial ability is the average of the first five tests and the final ability from which the gross gain is calculated is the average of the last five tests in the training series (See Table I). The gross gain in every case is simply the difference in seconds between the initial and final performance. On account of the

small number of subjects and certain differences in initial time it seems best not to attempt to express the results in per cent. or by more elaborate methods. Although averages are given, references will be made constantly to the individual records. These averages will be found at the bottom of the table, and the reliability of the average is given in terms of its probable error.

TABLE II.

Influence of Training in Color Naming Test Upon Ability in Form Naming Test.

Training Series			Test Series				
			Trained Group		Control Group		
Subject			Subject				
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain		Init. Perf.	Gr. Gain
A	43.6	5.0	62.2	3.7	E	68.5	5.0
B	38.4	1.0	60.5	−13.2	F	78.6	10.1
C	45.8	2.4	51.4	− 6.3	G	57.2	10.1
D	31.4	−4.8	58.4	7.1	H	75.8	1.1
					I	68.9	3.8
Av.			58.1	− 2.2		69.8	6.0
P. E.				3.2			1.2

A glance at the averages of the test series for the trained group and the control group suggests that the practice caused interference rather than transfer of improvement. The probable error of the averages concerned, however, shows that the difference in time between the two is unreliable. If one considers the separate subjects, it will be seen that for B and C the practice apparently caused interference. For subjects A and D there was a gain of 3.7 and 7.1 seconds respectively. But when this gain is compared with the average gain of the control group, which is 6.0 seconds, this would appear to be no gain attributable to the training series. In considering the lack of transfer, one must note the small gain in the training series. Subject D, who lost in the training series, is the one who gained most in the test series (7.1 seconds). Such phenomena have been reported many times in transfer work. But in this case the matter is simple enough. The gain made by this subject is only one second more than the average gain of the control group, which is 6.0 seconds. Keeping in mind the P. E. of this average, which is 1.2, the gain of 7.1 seconds is what might be expected from one who had had no training whatever.

This experiment, then, shows only very slight gain in the training series, no reliable transfer or interference in the case of two subjects, and interference in the case of the other two. The slight amount of improvement as a result of the long course of training obviously makes the test a poor one for studies in transfer.

II. The Influence of Training in the Opposites Test upon Ability in the Adjective-Noun Test.

The opposites test which forms the training series consisted of 50 moderately difficult opposites given in the Woodworth and Wells monograph on Association.[5] The Adjective-Noun test used in the test series consisted of the same set of stimulus words to which appropriate nouns were to be attached. If the process involved here be analyzed, we find the objective situation to be identical in the test series and training series, but the response is different, an appropriate noun instead of an opposite being required. A bond formed in the training series between a word and its opposite must be broken and a new bond formed between the given stimulus word and an appropriate noun. Thorndike, in analyzing such connections as this, says, "In the case of alternate systems of bonds, there is, then, often an inhibition for a time, reducing to zero as the two systems of bonds get organized into connection with two systems of mental sets or attitudes, and perhaps giving way to facilitation by reason of certain serviceable identities in the bonds.[6] In the present experiment there is no opportunity for such alternate bonds to be established by long training, and the question is: Will the formation or strengthening of a certain bond facilitate the formation of a possible alternate bond?

The results of this test are given in Table III. The arrangement of this table is identical with that of Table II. The initial performance in the training series and the gross gains are obtained from Table I. The average gross gain in the test series for the trained and control group show an interference as a result of training. Two of the subjects, A and B, have a poorer record in the final test than in the first test series, as indicated by the minus signs. But the other two subjects, C and D, who show a

[5] Psych. Rev. Mon. Vol. XIII, No. 5, 1911.
[6] Loc. cit., p. 356.

gain of 5.5 and 1.0 seconds respectively, have gained less than the control subject who gained the least (Subject F with a gain of 7.2 seconds). The probable error of the averages here is small enough to make the difference between the trained and control group significant. Subject A, who made the greatest gain in the training series, also showed the greatest interference in the test series. These results suggest that, when the possibility of transfer is limited to specific elements, the formation of bonds between a given stimulus and a certain response interferes with the formation of a bond between the same situation and a new response.

TABLE III.

The Influence of Training in the Opposites Test Upon Ability in the Adjective-Noun Test.

Subject	Training Series		Test Series			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	90.4	57.8	77.2	−7.7	E 75.3	15.0
B.....	31.6	3.1	53.5	−6.8	F 60.3	7.2
C.....	24.6	4.0	67.4	5.5	G 57.2	11.3
D.....	29.6	6.5	107.9	1.0	H 119.8	37.1
					K 52.2	7.6
Av.....			76.5	−2.0	73.0	15.6
P. E.				2.2		3.2

III. The Influence of Training in the Cancellation of 3 and 5 Separately upon Cancellation of Groups Containing Both 3 and 5.

The material for these cancellation tests consisted of the number checking blank described by Woodworth and Wells for the training series, and the number group checking blank, described by the same authors, for the test series. Only one-half of the number checking blank was used at a time. The time for completing each blank was taken, no error being permitted. As in the previous cases, the test series consisted of five tests before and five after the training interval, while the training consisted of 100 repetitions of the given test. In this case, the training consisted of the cancellation of 3's in 50 blanks and of 5's in 50

blanks, the first blank being for 3 and the second for 5 and so on. The procedure in the number group checking test consisted in canceling every group which contained the two numbers 3 and 5. Errors in this test were not immediately corrected. A penalty was arbitrarily assigned for each error. The average time for each figure canceled was determined for each blank and this multiplied by the number of errors. This amount was added to the total time for that blank. This correction for errors made no appreciable difference in the results.

In this experiment, the training series consists in forming two bonds between separate situations and responses, one in the cancellation of 3's and the other in the cancellation of 5's. The test series when analyzed shows these two stimuli to be present, the response now being to a total situation containing these two stimuli. This bond seems to resemble quite closely that described by Thorndike[7] as "Entire similar change by composition of totals," in which he employs the following example: "The bonds ABC-1, 2, 3, and XYZ-48, 49, 50, being strengthened, the bond ABCXYZ-1, 2, 3, 48, 49, 50 is strengthened."

The results of this experiment are shown in Table IV. This table is constructed exactly as Table II. The average gain in the training series is 22.4 seconds. The average gain in the control group in canceling the number groups containing 3 and 5 is 11.5 seconds, with a high P. E. of 4.0. The average gain in the trained group in canceling like number groups is 23.7 seconds. This difference of 12.2 seconds in favor of the trained group may be attributed to the transfer of the effect of the training. The reliability of this difference expressed in terms of the P. E. of the difference is about 5.0. That is, the difference is about 2.5 times the size of its probable error. The chances of this difference being real are then about 900 in 1000. Expressed in terms of per cent. of the initial performance, the average gain due to transfer would be about 8 per cent.

This test seems to indicate that learning is facilitated by incorporating into the process to be learned previously formed bonds between situation and response, or, in other words, it indicates the transfer of identical elements.

[7] Loc. cit., p. 351.

TABLE IV.

Influence of Training in Cancellation of 3 and 5 Upon Cancellation of Groups Containing 3 and 5.

Subject	Training Series		Test Series					
			Trained Group		Control Group			
			Subject					
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain		Init. Perf.	Gr. Gain
A.....	68.0	30.0	144.4	16.3	E	166.1	4.9
B.....	60.4	21.0	125.0	16.0	F	159.5	17.0
C.....	60.0	15.9	171.4	26.0	G	150.6	24.8
D.....	75.0	22.5	163.1	36.5	J	139.5	−0.9
Av.....			151.0	23.7		153.9	11.5
P. E.....				3.2			4.0

IV. The Influence of Training in the Cancellation of 3 and 5 Separately upon Cancellation of Groups Containing 4 and 7.

In these tests the material and procedure are the same as described in the preceding section. The test series consisted in the cancellation of groups containing 4 and 7, instead of those containing 3 and 5. In this case there is no combination of ready formed specific bonds into the new situation-response as there was in the preceding case. There are here no identical elements concerned in the two processes except the more general adaptations which we have tried to eliminate. Although there are no identical elements in the two situations, there is still no necessity of breaking, in the test series, any specific bond formed in the training series, as was the case in Experiment II, the Opposite and Adjective-Noun test.

The results of this experiment are shown in Table V. If the average gains in the trained and control group are compared, the two will be found to agree, 15.0 and 15.9 respectively. The probable errors of these averages show that they are fairly reliable. Here one finds neither an interference nor a facilitation as a result of the training, while the analysis showed neither transfer nor breaking of specific bonds.

TABLE V.

Influence of Training in Cancellation of 3 and 5 Upon Cancellation of Groups Containing 4 and 7.

Subject	Training Series		Test Series			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	68.0	30.0	130.6	10.4	E 134.3	14.5
B.....	60.4	21.0	118.8	15.8	F 143.3	16.3
C.....	60.0	15.9	162.7	11.8	G 124.1	24.0
D.....	75.0	22.5	159.1	22.0	J 124.7	8.9
Av.....			142.8	15.0	131.6	15.9
P. E.....				1.6		1.8

V. The Influence of Training in Simple Addition upon Ability in Subtraction.

The material for this test consisted of a series of 50 two-place numbers ranging between 20 and 80 and excluding all numbers containing a zero. The task was to add 17 to each of these numbers as rapidly as possible. The same 50 numbers were used during the whole training process, but were presented in 10 different arrangements. The subtraction test consisted in subtracting 17 from each of a list of 25 numbers as rapidly as possible. This list was obtained directly from the addition list by adding 17 to each. All errors were announced by the experimenter and corrected by the subject. The results are given in terms of time, as in the other tests.

In this experiment there are no identical bonds in the two cases. There is no identity either in the situations or in the responses. It must be said here that in the long training the responses in the addition test never became a matter of such simple association as one finds in the ordinary association tests. Except in the case of a very few numbers, the addition process was actually carried out, although various short cuts were devised.

The results are given in Table VI. The gross gain in the trained group was 8.8 seconds, and in the control group 15.1 seconds. The large gain of the control group is seen to be due to subjects F, I, and O, whose initial performance was high. The difference between the two groups, 6.3 seconds, with the high probable error

TABLE VI.

Influence of Training in Addition Upon Ability in Subtraction.

Subject	Training Series		Test Series			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	109.2	52.4	59.7	7.0	F 107.7	20.3
B.....	95.2	35.2	67.9	14.9	I 147.3	49.1
C.....	110.0	61.4	64.5	4.3	J 70.7	4.8
D.....	242.0	191.2	143.8	8.9	K 91.8	0.0
					L 46.2	−1.9
					N 101.6	5.6
					O 122.9	27.5
Av.....			84.0	8.8	98.3	15.1
P. E.....				0.7		4.8

attached to the control average, is of little significance and cannot be considered as evidence of interference.

Here again there is an absence of identical bonds in the training and control tests and an absence of transfer or interference as a result of the training.

IV. The Influence of Training in Addition upon Ability in Multiplication.

The training series in this test is the same as that in the preceding experiment, i. e., the Addition-Subtraction test. The test series consisted in multiplying each of 25 of these same figures by 7, instead of adding 17 as in the training series. Here the stimulus is the same in the training and control material, while the response is different. The test series necessitates the formation of new connections and the consequent breaking of those formed in the training series. This is a condition analogous to that found in Experiment III, where the association process was changed from the naming of opposites to the naming of nouns to fit the adjectives. It will be remembered that in that case there was an interference. In multiplication by a two-place number there is a certain amount of identity with addition, in that the latter is involved as a part process, but addition plays no part in multiplication by a one-place number.

The results of this experiment are given in Table VII. Comparing the gains of the trained and control group in the test

series, we find the former gained 11.4 seconds and the latter gained 29.7 seconds. Taking the gain of the control group as typical of untrained subjects, we find an interference effect from the training amounting to 18.3 seconds. The probable error of this difference is 6.5, making the difference about 3 times its P. E.

Here again we have an interference resulting when the multiplication process requires the breaking of definite bonds formed by training in the addition process.

TABLE VII.

Influence of Training in Addition Upon Ability in Multiplication.

Subject	Training Series		Test Series				
			Trained Group		Control Group		
			Subject				
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.		Gr. Gain
A.....	109.2	52.4	.....	....	F	186.5	60.8
B.....	95.2	35.2	85.3	− 5.0	G	126.1	31.3
C.....	110.0	61.4	119.3	−19.4	J	132.3	26.1
D.....	242.0	191.2	205.4	19.9	L	101.3	12.8
					M	84.8	17.3
					N	168.7	29.6
Av.....			136.7	11.4		133.3	29.7
P. E.....				5.3			3.8

VII. The Influence of Training in Addition upon Ability in Division.

The training series in addition is identical with that in the two preceding tests. The test series consisted in dividing a series of 25 numbers by 7 as rapidly as possible. This list of 25 numbers was obtained by multiplying each number in the addition list by 7. Since 25 numbers constituted only half of the original list of 50 numbers, there were twenty different arrangements of the numbers in this test as in the two proceding experiments. As before no errors were permitted.

In this experiment the processes involved in the test series show neither a specific situation nor a specific response in common with the training series. Neither is there the necessity of breaking

TABLE V.

Influence of Training in Cancellation of 3 and 5 Upon Cancellation of Groups Containing 4 and 7.

Subject	Training Series		Test Series				
			Trained Group		Control Group		
			Subject				
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain		Init. Perf.	Gr. Gain
A.....	68.0	30.0	130.6	10.4	E	134.3	14.5
B.....	60.4	21.0	118.8	15.8	F	143.3	16.3
C.....	60.0	15.9	162.7	11.8	G	124.1	24.0
D.....	75.0	22.5	159.1	22.0	J	124.7	8.9
Av.....			142.8	15.0		131.6	15.9
P. E.....				1.6			1.8

V. The Influence of Training in Simple Addition upon Ability in Subtraction.

The material for this test consisted of a series of 50 two-place numbers ranging between 20 and 80 and excluding all numbers containing a zero. The task was to add 17 to each of these numbers as rapidly as possible. The same 50 numbers were used during the whole training process, but were presented in 10 different arrangements. The subtraction test consisted in subtracting 17 from each of a list of 25 numbers as rapidly as possible. This list was obtained directly from the addition list by adding 17 to each. All errors were announced by the experimenter and corrected by the subject. The results are given in terms of time, as in the other tests.

In this experiment there are no identical bonds in the two cases. There is no identity either in the situations or in the responses. It must be said here that in the long training the responses in the addition test never became a matter of such simple association as one finds in the ordinary association tests. Except in the case of a very few numbers, the addition process was actually carried out, although various short cuts were devised.

The results are given in Table VI. The gross gain in the trained group was 8.8 seconds, and in the control group 15.1 seconds. The large gain of the control group is seen to be due to subjects F, I, and O, whose initial performance was high. The difference between the two groups, 6.3 seconds, with the high probable error

TABLE VI.

Influence of Training in Addition Upon Ability in Subtraction.

Subject	Training Series		Test Series			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	109.2	52.4	59.7	7.0	F 107.7	20.3
B.....	95.2	35.2	67.9	14.9	I 147.3	49.1
C.....	110.0	61.4	64.5	4.3	J 70.7	4.8
D.....	242.0	191.2	143.8	8.9	K 91.8	0.0
					L 46.2	−1.9
					N 101.6	5.6
					O 122.9	27.5
Av.....			84.0	8.8	98.3	15.1
P. E.....				0.7		4.8

attached to the control average, is of little significance and cannot be considered as evidence of interference.

Here again there is an absence of identical bonds in the training and control tests and an absence of transfer or interference as a result of the training.

IV. The Influence of Training in Addition upon Ability in Multiplication.

The training series in this test is the same as that in the preceding experiment, i. e., the Addition-Subtraction test. The test series consisted in multiplying each of 25 of these same figures by 7, instead of adding 17 as in the training series. Here the stimulus is the same in the training and control material, while the response is different. The test series necessitates the formation of new connections and the consequent breaking of those formed in the training series. This is a condition analogous to that found in Experiment III, where the association process was changed from the naming of opposites to the naming of nouns to fit the adjectives. It will be remembered that in that case there was an interference. In multiplication by a two-place number there is a certain amount of identity with addition, in that the latter is involved as a part process, but addition plays no part in multiplication by a one-place number.

The results of this experiment are given in Table VII. Comparing the gains of the trained and control group in the test

series, we find the former gained 11.4 seconds and the latter gained 29.7 seconds. Taking the gain of the control group as typical of untrained subjects, we find an interference effect from the training amounting to 18.3 seconds. The probable error of this difference is 6.5, making the difference about 3 times its P. E.

Here again we have an interference resulting when the multiplication process requires the breaking of definite bonds formed by training in the addition process.

TABLE VII.

Influence of Training in Addition Upon Ability in Multiplication.

Subject	Training Series		Test Series			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	109.2	52.4	.....	....	F 186.5	60.8
B.....	95.2	35.2	85.3	− 5.0	G 126.1	31.3
C.....	110.0	61.4	119.3	−19.4	J 132.3	26.1
D.....	242.0	191.2	205.4	19.9	L 101.3	12.8
					M 84.8	17.3
					N 168.7	29.6
Av.....			136.7	11.4	133.3	29.7
P. E.....				5.3		3.8

VII. The Influence of Training in Addition upon Ability in Division.

The training series in addition is identical with that in the two preceding tests. The test series consisted in dividing a series of 25 numbers by 7 as rapidly as possible. This list of 25 numbers was obtained by multiplying each number in the addition list by 7. Since 25 numbers constituted only half of the original list of 50 numbers, there were twenty different arrangements of the numbers in this test as in the two proceding experiments. As before no errors were permitted.

In this experiment the processes involved in the test series show neither a specific situation nor a specific response in common with the training series. Neither is there the necessity of breaking

any specific bonds formed in the training series in adapting one's behavior to the test series.

The results are given in Table VIII. If one takes into account the reliability figure attached to the gain in the case of the trained and control groups in the test series, one finds no difference in the gain made by the trained and control groups. A difference of 1.8 seconds between 21.3 and 19.5 would be of no significance. We conclude that there is neither interference nor facilitation shown as a result of the training in addition.

TABLE VIII.

Influence of Training in Addition Upon Ability in Division.

Subject	Training Series		Test Series			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	109.2	52.4	72.9	19.0	E 258.9	55.4
B.....	95.2	35.2	52.7	5.3	F 82.3	5.9
C.....	110.0	61.4	88.9	9.3	G 85.7	19.9
D.....	242.0	191.2	186.3	51.5	L 60.4	−1.1
					M 63.2	20.8
					N 76.8	16.3
Av.....			100.2	21.3	104.6	19.5
P. E.....				6.3		4.3

VIII. Conclusion.

The experiment as a whole is intended as an intensive study of the transfer problem, upon a small number of subjects, with material that can be analyzed into stimulus and response fairly easily. It aims to determine the influence of training in cases where the relation between the processes varies from close similarity to complete antagonism. It aims, further, to limit the transfer effect to specific bonds between stimulus and response by eliminating the more general and common sources of improvement. It will probably never be possible to analyze any process into terms of stimulus and response within the nervous system, where any real transfer must finally be located. But if the commonly accepted meaning be given to the terms stimulus, response, and bond or connection, the experiment seems to show the following:

1. Where there are no identical bonds between stimulus and response in the two processes, the influence of one test upon another will be neither positive nor negative, i. e., there will be neither transfer nor interference. (Cancellation of 3 and 5—Cancellation of 4–7 group; Addition-Subtraction; Addition-Division; possibly Color Naming—Form Naming.)

2. Where there are identical elements in the two situations, or where a given process involves one or more bonds previously formed, there will be a positive or transfer effect. (Cancellation of 3 and 5—Cancellation of 3-5 group.)

3. Where one test necessitates the breaking of previously formed bonds and the formation of new ones, there will be a negative effect or an interference. (Opposites—Adjective-Noun; Addition-Multiplication.)

TWO CHILDREN'S PROGRESS IN SPEECH.

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I. Introduction.

This paper is the second on the general subject of the speech of children, being a continuation of an article showing the progress made in this direction by the author's daughter, Jane, up to the twenty-eighth month. The new material extends the observations concerning Jane to the thirty-sixth month, and presents those of her younger sister, Anne, through the first year.

II. Biographical.

The elder of the two children whose methods of acquiring the language of the race are here recorded was three years old March 14th, 1914, having been born at Tientsin, China, on that date in 1911. Nine months later she arrived in the United States with her parents, who since that time have lived chiefly in Montana, where Anne, the baby of the family, was born at Missoula, November 26th, 1912. Both the parents are college graduates and university teachers, the father of English-Welsh descent, the mother of English-Dutch-German. The children then are mostly English in inheritance, clearly showing this ancestry by their physical and mental characteristics. They are, however, in two lines of the fourth generation born in this country.

Both children have been continuously with their parents, living always in or near cities. They have not been much with other children, but have met many grownups at home and abroad, mostly of the university community. Both are systematically trained in self control and self help, their parents' attention being especially directed to this and to their health. They did not, therefore, receive any special instruction in speech, or other mental attainments, until Jane had passed her third birthday, after the taking of the vocabulary for that year. At that time Jane performed quickly, and correctly, all the modified Binet tests for children four years old and one of the tests for the next

year in age. She could have been taught to do others of these tests very easily, as was shown somewhat later when she drew circles, squares, and diamonds at will.

Both children have had almost perfect health since birth; the younger affected with the mildest of colds as literally her only ailment during the first twenty months of her life. Jane has not been quite so fortunate, but has had very little illness. Both are large, sturdy, and hard, the personification of health and happiness. Table I shows their heights and weights at successive periods.

TABLE I.

Jane	Birth	12 mos.	28 mos.	36 mos.
Height in inches	19	29.25	35.5	37.5
Weight in pounds	8	22	32.2	34.1
Anne				
Height in inches	20	29		
Weight in pounds	8.5	22.25		

III. Method of Acquiring Data.

The same methods were used as described in the previous paper, except that three weeks were required instead of two.

During the three weeks beginning with the third birthday, somebody was with the child constantly, father, mother, or student assistant. All that the child said was recorded on large sheets of paper, but during the later part of the period words known to be already recorded were not written down. The vocabularies were compiled from these papers. The child was engaged in conversation on occasion to draw out infrequently used words, and was sometimes asked the names of objects, etc. An effort was made to have words in the earlier vocabularies used. In all cases only the spontaneous talking was recorded, but not obvious imitations of nursery rhymes, etc.

This time the child was more conscious from the beginning that her conversation was under closer scrutiny than usual, and after a few days understood what was going on. She then asked frequently if certain words were noticed, coming sometimes to repeat a word with the explanation, "I know that." She wished to see the written slips and examined them with great care in an apparent effort to discover what it all meant. In addition she

was particularly solicitous about "bridge," asking her father many times one afternoon if he had it down. After this she lost interest, and for the greater part of the three weeks took little further notice of the experiment. Some authors seem to see some danger to the validity of the results in such an interest on the part of the child, but none could be detected here.

IV. Vocabularies.

In the compilation of these vocabularies, the same principles were followed as before. Briefly these are as follows:

1. No proper nouns. 2. No variants of verbs and adjectives, except a few of the verb "to be." 3. All forms of pronouns are included. 4. No plurals unless the singulars were not used. 5. The same word is listed twice or more according to its grammatical use by the child. 6. Shortened and coined words are in quotation marks.

Anne's Vocabulary at Twelve Months.

Nouns —ball, chow, daddy.
Verb —see.
Adjective —dear.
Adverbs —down, good-bye.
Interjections—boo, hello.

Jane's Vocabulary at Thirty-Six Months.

A. Nouns—animals, apple, appetite, apron, arm, ashes.
Verbs—am, ask.
Adjectives—a, afraid, all, another, any, asleep, awake.
Adverbs—again, almost, all, alright, around, away, awfully.
Prepositions—about, at.
Conjunction—and.
Interjection—ah.

B. Nouns—baby, back, bacon, bag, ball, banana, bark, basket, bath, bath-room, beans, bear, bed, beef, beets, bell, belt, bench, bib, bit, bite, bird, birthday, biscuit, blackberry, blanket, block, boiler, bone, bonnet, book, bouquet, bottle, bowl, box, boy, bread, breakfast, bridge, broom, bruise, brush, buckle, butter, button, buttonhole.
Verbs—bake, bark, be, become, bite, blow, break, bring, brush, build, bump, button-up.
Adjectives—bad, better, big, blue, both, broken, brown.
Adverbs—back, beside, better.
Preposition—by.
Interjections—bang, boo.

C. Nouns—cabbage, cake, can, candle, candy, cap, car, card, carrots, cart, cascara, casserole, cheek, cherry, cheese, chick, chicken, chin, chocolate, cat, cellar, chain, chair, charcoal, chow, clock, closet, clothes, clothes-line, clothes-pin, coal, coal-bucket, coat, cocoa, coffee, collar, cold cream, comfort, comb, corn-bread, cookie, cork, cotton,

couch, crack, cracker, crayon, cream, cream pitcher, crumbs, crust, cube, cup, cupboard, curtain, custard.
Verbs—can, can't, capsize, carry, catch, choke, chop, clean, come, cook, cool, cough, crawl, cross, crow, cry, cut.
Adjectives—chocolate, clean, cold, cotton, cracked, crooked cute.
Adverbs—careful careless.

D. Nouns—daddy, darner, date, dessert, desk, diaper, dimple, dining-room, dinner, dirt, dish, ditch, dog, doll, door, drainer, drawer, draught, dress, dressing-gown, drink, drum, duck, duster.
Verbs—dance, deserve, do, don't, drag, drain, draw, dress, drink, drop, dust.
Adjectives—dark, dear, dirty, dizzy.
Adverb—down.

E. Nouns—ear, edge, egg, elastic, elbow, enough, everything, eye, eyebrow.
Verbs—eat, excuse, expect.

F. Nouns—face, feather, finger, fingernail, fire, fish, floor, flower, flour, fly, foot, fork, fun, fur, furnace.
Verbs—fall, feel, fetch, fill, find, fit, fix, fly.
Adjectives—fat, first, four, full, funny.
Adverb—farther.
Preposition—for.

G. Nouns—garter, girl, glass, gloves, goat, goose, go-cart, "gran" (grandma), grape-juice, grease, ground.
Verbs—get, give, go, grunt, gulp, gurgle.
Adjectives—gold, good, great, grimy.
Adverbs—good-bye, good-night.

H. Nouns—hair, band, handle, hammer, "hankie" (handkerchief), hash, hat, head, heat, heel, high-chair, hole, home, hook, horn, house, horse.
Verbs—hammer, hang, have, hear, help, hit, hold, hunt, hurt, hurry.
Adjectives—hard, heavy, hot, hurt.
Adverbs—hard, here.
Pronouns—him, his, he, her.
Interjections—hello, ho, hush.

I. Nouns—ice, icing, iron.
Verbs—iron, is.
Adjective—imaginary.
Pronouns—I, it.
Preposition—in.
Conjunction—if.

J. Nouns—jacket, jam, jar, jelly, juice.
Verb—jump.
Adjective—juicy.
Adverb—just.

K. Nouns—key, kiddie, kindling, kiss, kitchen, knife, knob.
Verbs—keep, kick, kiss, knock, know.
Adverb—kind-of.

L. Nouns—lace, lamb, lap, leaf, leg, leggins, lesson, letter, library, lid, light, lips, "lots."
Verbs—laugh, lay, lean, let, lick, lie (recline), like, listen, lock, look, love.
Adjectives—last, little, long, lost, lovely.
Adverbs—level, like, lot.

M. Nouns—macaroni, machine, man, marble, mat, matches, matter, mattress, meadow-larks, meat, milk, minute, monogram, moon, mother, mountain, mouth, mouthful, muff, mush.
Verbs—make, mean, meet, move, muss, must.
Adverb—more.
Pronouns—me, mine, my, myself, my-own.

N. Nouns—nail, nose, neck, needle, new-skin, night, nightgown, noise, "nap-kum" (napkin).
Verb—notice.
Adjectives—nasty, naughty, new, nice.
Adverbs—no, not, now.

O. Nouns—onion, orange, owl.
Verb—open.
Adjectives—old, one, other.
Adverbs—off, on, out outside, over.
Prepositions—of, on, over.
Interjections—oh, ouch.

P. Nouns—page, pail, paint, pan, panties, "pan-sweep" (dust-pan), paper, party, path, pease, peeling, pencil, penny, petticoat, people, piano, picture, pie, piece, pig, pillow, pillow-case, pin, pipe, plant, place, plate, plenty, plug, pocket, poker, pot, potato, prunes, pudding, pussy.
Verbs—pat, peek, peel, pick, play, point, poke, pop, pull, put, push.
Adjectives—pink, precious, pretty.
Adverb—please.

Q. Adverb—quick.

R. Nouns—racket, raisin, rattle, register, rice, ride, ring, rock, rockingchair, rompers, room, rooster, rubber, rug.
Adjectives—raw, red, ready, round.
Verbs—rain, reach, read, ride, rock, run.
Adverbs—round, right.

S. Nouns—salt, salve, samples, sandal, sauce, schoolside, scissors, screen, screw, seeds, sheep, shirt, shoe, shoe-lace, shovel, sink, sister, sled, sleeve, slipper, snow, soap, sock, something, sound, soup, spanking, spider, spinach, spoon, squeaker, star, steam, stencil, steps, stink, stick, stone, stool, stove, strap, strawberry, string, stuff, suei' chow, sugar, sun, sunshine, swatter, syrup.
Verbs—say, scratch, see, sew, shall, shave, shove, shut, sing, sit, sizzle, sleep, smell, sneeze, spank, spill, spit, sport, squeak, squeeze, stand, stay, step, straighten, strike, stop, suppose, swat, sweep.
Adjectives—shut, sick, soft, such.
Adverbs—so, some, sure.
Pronoun—she.

T. Nouns—table, table-cloth, tablet, tail, taste, tea-pot, tea-party, tear, tear, teeth, thing, thimble, thumb, tea, thread, tie, time, toast, toe, toilet, tonight, town, towel, toys, tomatoes, tongue, train, tray, tree, trousers, trunk, tub, tube.
Verbs—take, talk, tear, thank, think, thread, tickle, tie, touch, turn, try.
Adjectives—that, the, this, thirsty, three, tight, tired, two.
Adverbs—through, today, tonight, too.
Prepositions—there, through, to.
Pronouns—them, they, that, this.
Interjection—there.

U. Nouns—umbrella, underwear, university.
Verb—undress.
Adverbs—under, up.
Preposition—up.
Pronoun—us.

V. Nouns—vase, vaseline.
Adverb—very.

W. Nouns—waffle, wagon, waist, walk, wall, wash-rag, water, way, wheel, whiskers, wind, window, wood, wood-pile, word, wringer, wrist.
Verbs—wake, walk, want, wash, watch, wear, weave, will, write, would.
Adjectives—well, wet, white, woolen.
Adverbs—when, where, while, wide.
Preposition—with.
Pronouns—we, what.
Interjections—well, whoa, whoop.

Y. Adverbs—yes, yet.
Pronouns—you, your.

The following table shows the number of words of each initial letter classified as to grammatical form, the total number of words beginning with each initial letter, and finally the total number of words in the vocabulary.

TABLE II.

Initial	Nouns	Verbs	Adjectives	Adverbs	Pronouns	Prepositions	Conjunctions	Interjections	Total
S.....	50	29	4	3	1	0	0	0	87
C.....	56	17	7	2	0	0	0	0	82
B.....	46	12	7	3	0	1	0	2	71
T.....	33	11	8	4	4	3	0	1	64
P.....	36	11	3	1	0	0	0	0	51
W.....	17	10	4	4	2	1	0	3	41
D.....	24	11	4	1	0	0	0	0	40
H.....	17	10	4	2	4	0	0	3	40
L.....	13	11	5	3	0	0	0	0	32
M.....	20	6	0	1	5	0	0	0	32
F.....	15	8	5	1	0	1	0	0	30
A.....	6	2	7	7	0	2	1	1	26
R.....	14	6	4	2	0	0	0	0	26
G.....	11	6	4	2	0	0	0	0	23
N.....	9	1	4	3	0	0	0	0	17
O.....	3	1	3	5	0	3	0	2	17
K.....	7	5	0	1	0	0	0	0	13
E.....	9	3	0	0	0	0	0	0	12
I.....	3	2	1	0	2	1	1	0	10
J.....	5	1	1	1	0	0	0	0	8
U.....	3	1	0	2	1	1	0	0	8
Y.....	0	0	0	0	2	2	0	0	4
V.....	2	0	0	1	0	0	0	0	3
Q.....	0	0	1	0	0	0	0	0	1
X.....	0	0	0	0	0	0	0	0	0
Z.....	0	0	0	0	0	0	0	0	0
	399	164	75	52	21	13	2	12	738

Table III shows the percentage each part of speech is of the total number of words.

TABLE III

	Nouns	Verbs	Adjs.	Advs.	Prons.	Preps.	Conjs.	Ints.	Total
No.....	399	164	75	52	21	13	2	12	738
Pct.....	54.07	22.22	10.16	7.05	2.84	1.76	.27	1.63	100

In Table IV is shown the number of words beginning with each initial sound.

TABLE IV.

Sound	No. of Words	Sound	No. of Words
K	76	N	21
S	72	Th	20
B	71	O	17
P	51	Ch	14
T	44	E	12
D	40	Sh	11
H	40	I	10
L	32	Wh	8
M	32	J	8
F	30	U	8
W	30	Sc	5
R	29	Y	4
A	26	V	3
G	23	Q	1
			738

Proper Nouns—Bateman, Billie, Bobbie, Dr. Bolton, Miss Edmonds, Fido, Grandranch, Gretchen, Jane, Mr. Landmaid, Lennes, Mrs. Lombard, Mammy, Patsy, Percy, Sam, Miss Selfidge, Mrs. Siebert, Smith—nineteen in all.

If these were included in the vocabulary they would increase the total to 757, of which the proper nouns would constitute 2.50 per cent.

V. Discussion of Vocabularies.

Number of Words—At twelve months Anne used nine words, while her sister at the same age used ten. The following vocabularies for one-year-olds have been published:

TABLE V.

Authority	Reference	No. Words	Nouns	Verbs	Adjs.	Advs.	Interjs.
Hall.....	7	24	19	2	0	0	3
Mickens.....	9	3	2	0	0	0	1
Moore.....	10	6	6	0	0	0	0
Pelsma.....	12	10	7	1	0	1	0
Perez.....	13	10	6	2	2	0	0
Tracy.....	14	10	6	0	2	2	0
Tracy.....	14	8	7	0	0	1	0
Bateman.....	1	10	5	2	2	0	1
Bohn.....	2	7	7	0	0	0	0

The average of the number of words in the vocabularies is 9.77; if the highest and lowest are left out, the average of the six remaining is 8.7, practically the same number comprising Anne's vocabulary. While the number of observations is small, it begins to appear that the ability to use 9–10 words at one year may furnish another form to show the mental development proper at this age.

Eight vocabularies appear to have been published for children three years old.

TABLE VI.

Author	Ref.	Total	Nouns	Verbs	Adjs.	Advs.	Prons.	Preps.	Conjs.	Interjs.
Gale.....	6	1176	675	238	143	53	33	17	7	10
Pelsma.....	12	681	406	147	65	31	14	9	1	8
Whipple.....	15	1771	993	391	209	89	33	24	8	24
Heilig	8	2135	...	...	...	..	..	..	..	..
Boyd.....	14	1657	918	344	200	109	30	29	21	6
Bush.....	5	1994	1042	506	214	75	50	33	11	14
Nice.....	11	1205	691	246	139	62	30	21	7	9
Brandenburg.	3	2282	1171	732	198	98	36	20	12	15

Of these, that published by Boyd does not give a detailed vocabulary.

The average number of words is 1612. This is much higher than Jane's vocabulary of 738 words. Of the eight, however, that given by Pelsma is the only one based on the principles of elimination as used in this paper. Whipple includes proper nouns, variants of verbs and adjectives, as well as a number of onomatopoetic sounds and queer interjections. All together these words number 190, leaving 1571, or over twice 738.

Whipple states that Richard, whose vocabulary he is discussing, was "perhaps somewhat farther advanced in general physical and mental development than the average child of his age," and again "that the vocabulary is apparently much larger than the average for the age." The list furnished by Gale contains very few words which would have been excluded from Jane's vocabulary, and therefore is about half as large again as the latter. This author believes his lists to be too small, and fixes "700 words as a typical vocabulary for a two-year-old child," with a nearly doubling of this during the first half of the third year. Pelsma, who emphasizes that Elizabeth, the subject of his paper, "is in every way a child of only average ability," declares these figures too high since "the average for two years as published in the lists

above is only 518, for three years 1209, and for four years 1149." These figures are changed somewhat by recent publications to 1419 and 1818 for the latter ages, but the argument probably still holds good.

In Heilig's lists classes of words are added, some or all of which would be excluded from all the other lists. The surplus of 530, which would not be counted in Jane's vocabulary, includes an unusually large number of proper nouns, past and present participles. Alice, too, judging by her interesting musical ability, is decidedly precocious in this direction at least, and recalls accounts of musical *Wunderkinder*. Again, all words were counted in which were used over a period of five months, during the last three of which especial attention was paid to recording every word known to the child. In this respect the vocabulary is not comparable to the first three citied. Bush's vocabulary was culled over even a longer period, six months. Boyd's was not complete until two months after the birthday.

By such methods all "once words," which do not come into permanent use until much later, are included in the vocabularies many of which may be mere imitations used with little understanding. The two methods give quite different results. By using only a comparatively short period, a fairly complete cross section of the child's status in speech is obtained for certain ages. By using long periods of time the result is a sort of resumé of what has been done and is doing. The one method is naturally incomplete in that it fails to catch some infrequently used words and lists others which will be "once words" tomorrow. The time element minimizes the latter, however. The other method catches almost all the flotsam and jetsam. Numerically they act in opposite directions The lists compiled according to one method may be said with more or less truth to show the child's status at three or four years, but the other method really sums up the activity between certain months. Furthermore, shortening the time does not seriously impair the size of the vocabulary, since by far the larger part is used during the first few days of observation, certainly during the first few weeks.

In compiling their vocabularies Nice adds proper nouns but Brandenburg adds proper nouns and inflections of verbs and adjectives. The former author states that "it is misleading to include past tenses and present participles in the vocabulary of

any child who can form them well. As some three-year-olds do not inflect their verbs, it should be noted whether or not they do, but the vocabularies need not be inflated." Certainly it would appear in the opinion of other observers that plural forms should be added as well for the sake of consistency.

If all variants, proper nouns, etc., are added to Jane's vocabulary, it amounts to 1086 words. This includes also the names of the letters O, T, and A. In these signs she took much interest shortly before her third birthday, wishing to learn more of them. Her interest was, however, diverted to simple words.

If all words used by her and forgotten again for several months previously were added in, the total number would be considerably higher. In this connection the list of lost words noted later is interesting.

Brandenburg adds to his vocabulary a list of 183 words not used by the child during the taking of the vocabulary but used previously as remembered by the parents. This the author calls "the sub-conscious vocabulary." It would seem to be a rather doubtful proceeding, since it is difficult to tell whether a word is forgotten or only "pigeon-holed." The author's children appear to have really lost words entirely from the memory and have had to learn them over again as new concepts. In many of the children examined more than once, numerous words present in one vocabulary have been missing from another. If the "sub-conscious vocabulary" is large it provides pitfalls for a treacherous memory.

As regards rate of progress, 333 words were acquired in 226 days, or an average of three words every two days.

Considering the above facts it seems still true that we have too little and too conflicting data upon which to base an estimate of vocabulary size normal for children three years of age. The earlier published vocabularies are usually those of somewhat precocious children. We need many more studies of children as normal as possible for their ages in order to be able to fix any norms for their stages in speech development.

Number Vocabulary: At three years of age Jane made few mistakes in number relations up to four, the error being in connection with the latter figure. "Lots" was used for larger numbers. She frequently used "six," "nine," like "sixty," "a hundred," but had not the faintest idea as to their meaning, for which reason they have been excluded from the list.

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Color Vocabulary: Blue, brown, pink, red, and white comprise the list. This is an increase of three terms, since only pink and white are found in the earlier vocabulary. All the above terms were used correctly in the majority of cases, while a few others—black, yellow, orange—were tried experimentally on various colors, though queerly enough none of these words were used during the three weeks the taking of the vocabulary was in progress. Whipple's boy used twelve color names and six terms such as dark, etc. The case reported by Gale shows the use of seven terms. Wolfe's (16) results show that five-year-old children recognize yellow the least readily of the primary colors including black and white. At least seven published vocabularies show that this term was not used at two years (indeed no color terms were used at all in three of these cases). Of the so-called secondary colors, green, orange, purple, none of Wolfe's forty-eight cases of five-year-old children could name the last, and only four named orange correctly. So tardy are children in general in acquiring those terms that Binet and Simon consider the correct naming of red, blue, green, yellow, as a mental test distinctive of the eight-year.

Pelsma's child knew an unusual number of color terms at three years of age. This the author attributes to the fact that "E's" mother used paints very frequently, thus interesting the little girl. This has not worked out in just this way with Jane, for while her mother, too, uses painting materials frequently, and Jane herself has always played with pastels and water colors, she seemed to take little interest in the color names themselves, and made many errors in tentative efforts to use them.

Parts of Speech: As was the case in the earlier vocabulary, the verbs form a larger part of the whole than found with any other child or group of children yet reported, the same being true of the adverbs. The disproportion between the nouns and verbs is less, however, than before. "What are you doing?" is Jane's favorite question, rather than "what's that?", which may account for the figures.

The following table shows the changes in this respect as well as the progress made during the first three years of life.

TABLE VII.

Parts of Speech	12 Months Number	12 Months Per cent.	28 Months Number	28 Months Per cent.	36 Months Number	36 Months Per cent.
Nouns.....	5	50	205	50.62	399	54.07
Verbs.....	2	20	95	23.46	164	22.22
Adjectives.....	2	20	47	11.60	75	10.16
Adverbs.....	0	0	31	7.65	52	7.05
Pronouns.....	0	0	12	2.96	21	2.84
Prepositions...	0	0	5	1.24	13	1.76
Conjunctions...	0	0	0	0.00	2	.27
Interjections...	1	10	10	2.47	12	1.63
Total.....	10	100	405	100.00	738	100.00

The conjunction "and" was the first of this class, and not used until the thirtieth month.

Coined Words: Like practically all children Jane is constantly using many original expressions. They do not appear in the above list since they are not allowed to become fixed in the child's memory, the correct expressions being substituted. Many of them are ingenious, some even with a touch of "heaven-sent cleverness," but since the memory associations form so readily they are scarcely ever repeated by the parents. To show how habits of this kind persist, it may be mentioned that since she was ten months old Jane has had a white, woolly sheep, her most treasured possession. This she called at that time a "dog," her class name for all animals, and it is still affectionately termed the "dear old doggie." Now she knows well enough that it is not a dog and has learned to forestall visitors' surprise by informing them that it is a sheep-dog, a term she coined herself of course with no idea of making a pun.

In this connection mention should be made of a short list of sounds used by both children as a sort of private code. These had little resemblance to ordinary English words, and are difficult to reproduce phonetically. One, "ungoon," seemed a sort of signal to inform each other of their whereabouts. Another, "huwee," always caused gales of hilarious giggling. They were used but little when grownups were around, and lasted but a short time, so no adequate record of them was obtained. The whole thing was interesting as suggesting the beginning of an invented language.

In many cases names were invented for objects, such as "pan-sweep" for dust pan. Sometimes these names were surprisingly

good, showing much observation on the part of the child. Indeed she often correctly saw analogies between things which had not before appeared to her parents in that light.

Objectionable Words, etc.: "Darn," lasting but a short time, has been replaced by the almost worse "awful." But when everybody, including professors of English, qualify everything under the sun with this over-worked word, who can blame the child for thinking things are awful, too? An effort to replace "lots," which was acquired early, by "much" and "many" is succeeding slowly. Naturally many ungrammatical terms are used, but they do not become permanent parts of the vocabulary, some of them needing only a single correction to disappear. "Lie" and "lay" are now used correctly.

Lost Words: All of the words used in the twelfth month are found in the succeeding list, but 39 words or 9.6 per cent. of the second vocabulary are not found in the third. An attempt was made to discover why these words had been lost, with the following results:

The vocabulary taken at twenty-eight months was in the summer time during July, while that of thirty-six months was taken in the late winter, March. This accounts for the loss of the following words, all summer terms: grass, honey, lawn, mosquito, rake (verb and noun), sticker. The "cabinet" was in the house but a short time; the present house has no "coal-shed"; the pup was stolen; "darn" was executed; no "ribbons" were in evidence; "kerplunk" became bang, chick chicken, nightshirt nightgown, and button changed to button-up. As to the other lost words, no reasons could be seen for their disappearance. Moreover, the child has used many words for short periods which do not appear in any of the vocabularies. Changes of all kinds necessarily go on all the time in the materials the child has for self expression.

New Words: Since the increase in the vocabulary was over three hundred words, it was not found possible to remember which were old and new during the three weeks needed to compile it.

VI. The Acquisition of Speech.

Anne—Anne's salutation to the world, expressed in very lusty fashion, consisted of short high-pitched cries not particularly expressive. In less than a minute they ceased abruptly, after

which the new-comer appeared quite comfortable, being discovered a few minutes later complacently looking at the light and chewing her fist. For about ten days the crying was like that described above, done apparently to do something rather than to express any emotion. Indeed the little life was so well regulated that there was small need to show hunger, pain, or discomfort. The "exercise cry" habit was instituted during the first week, at first in the nighttime, but training induced her to transfer this effort to the afternoon. After a few weeks two main styles of crying were to be distinguished, one the loud, more or less good natured, kind, in which were tried out different methods of vocalizing; the other of a low pitched, intermittent, fussy character, which ended when any attention was paid her.

During all of this no definite vocal sounds were heard, but the first of such was used during the eighth week. This was the long sound "A." Almost immediately the first consonant was prefixed to this, resulting in "ba." In a few days "o" was added together with "m"; after this all varieties and combinations of sounds were practised upon in very rapid succession. A great deal of this did not seem to be consciously directed, since the consonants prefixed to one vowel sound would change at random with accidental movements of the lips and tongue. On many occasions a new combination would catch the child's attention and be almost the only sound used for some time. Out of this grew in about the sixth month an especially favorite diversion; the repetition of variations on "uggle-guggle-guggle." During this time was developed, also, a beautiful, true vocal trill.

It was difficult to fix upon the first conscious imitation, but it was in full swing during the first part of the seventh month. Anne was anxious to imitate all done by her older sister, who in turn paid the baby the same compliment, although in a somewhat scornful spirit. The first word used with an appreciation of its meaning was "daddy," employed on the very day the youngster was ten months old. The next attainment was "ball," used proudly on all possible occasions, mostly mal-apropos, to which finally as a means of defense the grown-ups retorted with "shoe." The mild irony of this method or manner was readily perceived by Anne, who in a few days broke herself of the worst of the "ball" habit. On her first anniversary Anne was using nine words correctly and imitating many of those she heard used

around her. Her enunciation was good, but there was a tendency to leave off the final sound.

In general it may be noticed that Anne passed through the same stages in the same order as her sister before her, except that she reached the various stages in acquiring speech somewhat earlier than the latter.

VII. Progress in Speech.

Jane—Since her twenty-eighth month, Jane has gone on increasing her means for expression, using the same methods as outlined in the earlier paper. By imitation, observation, practice, and asking questions, she has acquired words, grammar, and ideas. The number of new words was on the average about three for every two days, although there was nothing regular about the rate. Some days there would be a flood of new terms, while during other periods the acquisitions were correspondingly sparse. Sometimes the rapidity of learning led to confusion. Thus on one evening she learned to use "hook" (for garments) and "elbow" correctly. The following morning, however, she began calling her elbow her hook and continued to do so for some time in spite of correction, later on using both names for the elbow, while giving a hook its proper name. In the same way at Christmas she confused "oyster" with some portion of her anatomy, but which part was not ascertained, since it seemed to be at different times her back, side, or shoulder. The derivation of "squeak" for her abdomen is obvious. In this connection it might be mentioned that Jane took a particular interest in feet, holding conversations with her own, ascribing emotions to them, blaming them for leading her in forbidden places, etc. She betrayed much surprise and interest in discovering her father's feet to be built on the same plan as her own. G. Stanley Hall, who has commented on this trait in children, found it not uncommon.

The amount of energy used by children in speech activity has often been spoken of. Hundreds of words will be uttered in an hour, including a large number of different words. In the course of a day the total number of words used is very large, especially with talkative children. In Jane's case it was found impossible to accurately determine these figures, long-hand not being sufficiently nimble to catch every word. On one occasion from a

twenty-minute count approximately three hundred and sixty words were heard, over two hundred being different. At this rate eight thousand to ten thousand words would be used in a day.

The gain in definite concepts for words noted has undergone another step forward. It may be remembered that "dog" was used first in its proper meaning, then applied to nearly all moving objects, next as a class name for animals, finally restricted to its proper place. These changes occurred during the fourteenth to the seventeenth month. In the thirty-second month the word "animal" was first used correctly as a class name, such expressions as "that cow is a animal" and "is the rooster a animal?" showing that the child had a very definite idea as to its meaning.

In grammar there has been a steady progress. At the beginning of the fourth year all parts of speech were in use including conjunctions which were not used at twenty-eight months. The parts of speech occurred in the following order: an interjection was the first word used, but nouns were the first as a class employed in the tenth month, verbs next in the eleventh, adjectives in the twelfth, adverbs fourteenth, pronouns sixteenth, prepositions seventeenth, conjunctions thirtieth. This order corresponds closely with that determined by other observers, except that the conjunctions appeared later than in most vocabularies. As regards sentences, the writer is of the opinion that practically all, if not all, of the child's talking has been done in sentence form. Even when only one word was uttered it was accompanied by gestures or actions, or inflected in such a way as to disclose that it meant complete thought. Just what was meant in many cases was not grasped by the parents, but in others the play of expression on one word came to mean very definite things to both them and the children. The word "drink" meant "I want a drink" or "give me a drink," when used with a certain expression; but said "that is a drink," "here's a drink," or "you are drinking," spoken with another inflection. In the sixteenth month combinations of two words were used such as "want drink," "go out," "I go," "your hat." At twenty months these had developed into "I want a drink," "you are going out?" "I'll go in the bathroom." Next, after an interval of confusion and apparent retrogression, longer and more complete sentences of many types were in use in the twenty-sixth month. Finally

with the addition of conjunctions in the thirtieth month, still more complex sentences were possible. As is the case with most children, parts of speech were interchanged, especially nouns and verbs, but this tendency grows less with age. At three years the distinction between adjectives and adverbs was clearly felt as shown by the use of careful, carefully, etc. Ungrammatical terms are used by applying to new words the rules already found to be true, such as joining regular forms to irregular verbs and plurals, or vice versa. "Flyed," "goed," "tooths," "feets," "cowses," and the like are used by all children as well as expressions like "I are," and "Did he went?" A single correction frequently eliminates some of these, although others are more persistent. In an environment of good English, however, none become permanent parts of the vocabulary except that even cultured parents sometimes injudiciously foist upon the child by repetition many of these ofttimes quaint expressions, which only become a nuisance to it later on. In this connection the persistent use of diminutives by many persons is as unwise, the child being forced to live in a world of "horsies," "doggies," "dollies," "pussies," "footsies," "toesies," "housies," until he gains the idea that English is built on the plan of the children's familiar "pig-Latin."

Of the factors entering into the acquisition of some words and the neglect of others, the difficulty of length or enunication seems to be the least potent. In this vocabulary the use of such words as casserole, imaginary, library, monogram, and university among others illustrate the point, and examples are to be found in all vocabularies published. Whipple and Gale believed service, ability, and interest, or the emotional content, to be more important factors than ease of pronunciation. With regard to enunciation there is again little to note. Always speaking very distinctly, on her third birthday Jane could imitate almost perfectly anything said to her. The word napkin still presents some difficulty, but has changed from "nakum" to "napkum," so that the difficult "pk" sound has been overcome. For some time it was thought that pillow and the like were perfectly pronounced but later it was found that the real sound used was "plo," a very much shortened sound of "i" being heard. Later still this became "pidlo," while Billy was called "Biddy." This was corrected shortly after the third birthday. The consonant

sounds in the middle of words between two vowels are the most difficult to enunciate clearly, besides the above examples "v" being converted into "b" being noted. Other difficult sounds, "th," "s," "r," have caused no trouble especially as initial sounds. The most of the latter at thirty-six months were K, S, B, P, T, D, H, as contrasted with the order K, B, S, P, H, T, at twenty-eight.

VIII. Mind Content.

At twenty-eight months Jane's answers to such questions as "What is a hat?" "What do you do with a spoon?" and "What are your feet for?" showed only associative memory, no true definition, and little mind content for individual words. At regular intervals these questions were repeated and answered in the same way until one evening in the thirty-fourth month. Then in answer to "What are your feet for?" she replied "To walk with on the ground. See my feet; there's your feet." Responses of this kind were rare, however.

The following shows some examples obtained at thirty-six months:

animal—The dog's a animal and the sheep.
bed—I go to sleep in my bed.
bathe—We go in the tub.
cup—Is to drink with.
chair—There's a chair. It's a rocking chair.
feet—To walk on. My feet jump.
handkerchief—To wipe my nose with.
shovel—I play with it.
tub—Jane gets clean in the tub.
trousers—Why do *you* wear trousers?

Thus in eight months some gain in concept has been won and considerable advance made in general comprehension of the questions asked and the kind of information expected. As is the case with all reported answers given by children in this way, the above replies are usually couched in terms of action related to concrete objects, and have no resemblance to the academic definitions given by older children in the grades and high school. It may be noted, however, that in many cases as complete definitions are made as are possible with the child's limited linguistic material. Webster's definition of "cup" is "a small vessel used

to drink from," and of "handkerchief" "a cloth to wipe the face with." Here the child's definitions are approximately as good, while they fail entirely with shovel, for instance. Again, even dictionary makers have much trouble with many words often the most commonplace, so that a child's definition of big as "big is big—a big book—and it isn't little now," does not fall so far behind the "bulky, large, huge," etc., of the dictionary.

Such conversations with the child are most interesting as showing its range of thought and ideas, its appreciation of fact, its emotions and interests, its correlation with life, as well as the new materials necessary to foster further mental development.

REFERENCES.

1. Bateman, W. G. *A Child's Progress in Speech.* Journ. Ed. Psychol., Vol. V, 307–320.
2. Bohn, W. F. *First Steps in Verbal Expression.* Ped. Sem., Vol. XXI, 578–593.
3. Brandenburg, G. C. *The Language of a Three-year-old Child.* Ped. Sem., Vol. XXII, 89–120.
4. Boyd, W. *The Development of a Child's Vocabulary.* Ped. Sem., Vol. XXI, 95–124.
5. Bush, H. D. *The Vocabulary of a Three-year-old Girl.* Ped. Sem., Vol. XXI, 125–142.
6. Gale, H. *The Vocabularies of Three Children in One Family at Two and Three Years of Age.* Ped. Sem., Vol. IX, 422–435.
7. Hall, W. S. *First Five Hundred Days of a Child's Life.* Child Study Mo., Vol. II, 585–608.
8. Heilig, M. R. *A Child's Vocabulary.* Ped. Sem., Vol. XX, 1–16.
9. Mickens, C. W. *Vocabulary.* Child Study Mo., Vol. III, 203–205.
10. Moore, Kathleen. *The Mental Development of a Child.* Psych. Rev. Mon. Sup., No. 3, 1886.
11. Nice, M. M. *The Development of a Child's Vocabulary in Relation to Environment.* Ped. Sem., Vol. XXII, 35–64.
12. Pelsma, John R. *A Child's Vocabulary and Its Development.* Ped. Sem., Vol. XVII, 328–369.
13. Perez, B. *The First Three Years of Childhood,* London, 1889. 2d Edition—Syracuse, 1894.
14. Tracy, F. *The Psychology of Childhood.* Boston, 1895.
15. Whipple, G. M. *The Vocabulary of a Three-year-old Boy.* Ped. Sem., Vol. XVI, 1–22.
16. Wolfe, H. K. *On the Color Vocabulary of Children.* Neb. Univ. Studies, Vol. I, No. 3, 205–234.

ABSTRACTS AND REVIEWS

KARL PEARSON. *The Life, Letters, and Labors of Francis Galton. Volume I.* Cambridge: University Press; New York: G. P. Putman's Sons, 1914. Pp. xxiii, 246. $5.60.

The application of modern doctrines of heredity to the development of the human race bids fair to be the most important movement of the coming generation. Charles Darwin through his promulgation of the principles of evolution in the development of species revolutionized the prevailing conception of animal and human life. But it is possible that the next few decades will see a change of attitude toward social relationships that will be of even greater importance than the influence of Darwin and his followers. Ten years ago there would have been little question as to which was the more significant figure in the history of human thought—Charles Darwin or Francis Galton. At the present day, evolution is taken for granted, but the mechanism of evolution advocated by Darwin is frankly questioned by biologists, while the founder of eugenics seems to be merely coming into his own.

It is well then that we should have this complete and authentic biography to supplement Francis Galton's own account of his life. As might be expected, the present biography differs widely from the traditional life story, in that great pains are taken to trace those elements in the remote ancestry of the hero which contributed to his accomplishments. Moreover, since the book is intended as a scientific monument to the memory of the master, and as it is compiled by the Director of the Eugenics Laboratory as a tribute to its founder, many details are included, not for their popular appeal, but for the sake of the complete narrative. No account of the ancestry of Francis Galton on his mother's side could fail to include much that is of interest and importance for an understanding of the life of his cousin Charles Darwin, so that the present book furnishes the most authentic picture of the hereditary influences that contributed to both these heroic thinkers. The book contains an abundance of plates presenting photographs of prints, silhouettes, facsimiles, letters and other material, all significant in understanding Galton's heredity.

The present volume carries the account from Galton's birth in 1822 to his marriage in 1853. The picture of his early life and his student years is constructed largely from Galton's own letters, and the letters and comments of members of his family. It must be borne in mind that Francis was the last child in a family of nine and that several members of the family were characterized by a remarkable longevity. Galton himself was 89 years old when he died. Two brothers lived to be 94 and 89, and of two sisters one died at 93 and the other at 98.

In childhood, Francis Galton was distinctly precocious, but with the advent of boyhood and school years this start seems to have been lost. At Cambridge, Galton scarcely found himself on a par with his fellows, and overwork resulted in a breakdown which seriously affected his subsequent career. His genius ripened late, and at one time it seemed that he would subside into the mediocrity of a country gentleman and contribute nothing of distinction to the increase of knowledge. The flowering of his scientific activities is reserved for consideration in a second volume. Accompanying the first volume are five pedigree plates, giving in graphic form the ancestry and collaterals of Francis Galton and Charles Darwin.

J. C. B.

THE

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EDITORIAL

EFFICIENCY IN THE TEACHING OF ENGLISH

Granting that English, natural science, social science, and art constitute the four corner stones of a liberal education, the question arises whether the present teaching of these subjects produces the best possible results, and in what ways it might be improved. In the past three or four decades, the amount of time and attention devoted to English in elementary and secondary curricula has exceeded that allotted to any other subject, and many critical students of education are beginning to inquire whether the results are commensurate with the expenditure of time and effort.

It is generally admitted that the two essential aims in the study of English from the first grade to the college are the development of such skill in the use of the vernacular that it becomes a ready tool for the oral and written expression of ideas, and a wide acquaintance with and appreciation of the best in literature. To what extent present courses and methods attain these ends and in what respects the teaching of English might be improved are fertile fields for inves-

tigation. In recent years we hear much about the need for training in oral composition. Several suggestive plans have been outlined, and teachers are making tentative efforts to organize this work in the upper elementary grades and in the high school. As yet, however, these projects suffer much from vagueness and lack of standards. No one has any definite idea as to what should be expected in oral English from the fourth grade pupil, the sixth grade pupil, the high school freshman, or the high school senior. We need measures of central tendency for each of the elementary and high school grades, and indications of the amount of variability about this central tendency.

In written composition the work on and with the Hillegas and Ballou scales has done much to clear the ground and enable us to appreciate the difficulties with which we are confronted. Most of this work, however, has been done with eighth grade pupils, and we still have no norms of performance for the various grades. Moreover, in the teaching of English composition the chief stress is laid on the illustration of certain grammatical and rhetorical principles, and little is done to develop standards of competent performance in the minds of the pupils.

Experimental studies and common-sense reflection unite in showing that too much time is spent in elementary schools on oral reading, and insufficient attention is given to training pupils in rapid and comprehending silent reading. Instead of a single basal reader and a few supplemental reading books for each grade, children should be not only encouraged but required to read from fifteen to twenty books per year. This would demand a much more careful study and grading of children's reading according to their abilities and interests, and would insure acquaintance with one hundred to one hundred and fifty books at the end of the elementary course. Time for this reading could be secured by the elimination of the waste in spelling, which recent studies have shown to be considerable, and by the relegation of formal grammar to the university.

The same principles of fluency of expression and wide reading in literature apply to English in the high school, and we need to know much more definitely to what extent these ends are attained at the present time, and whether changes in method would not produce better results. If we are to believe the teachers of college freshmen, there would seem to be decided room for improvement in the high school composition work; and it is difficult to conceive what sort of emotional appeal is made to adolescent pupils by the ordinary high

school courses in literature. Judging from the casual statements of the pupils it would seem that the usual effect of high school studies in literature is to stifle rather than awaken a love for good reading. In any event, there are dozens of problems in the teaching of high school English which call for critical and experimental investigation.

J. C. B.

NOTES AND NEWS

One of the most elaborate and thorough contributions that has yet been made to the subject of vocational education and vocational guidance is to be found in the recent report of Dr. David Spence Hill, director of the division of educational research, New Orleans public schools, in connection with the organization of the Isaac Delgado Central Trades School for Boys. The report contains a preliminary survey of the industrial activities of the southern Mississippi valley with particular reference to the hundreds of occupations related to the mechanical industries. There follows a detailed and elaborate account of the author's personal inspection and study of the representative local establishments in the following industries: metal manufacturies, power, light and heating plants, electrical manufacturing and construction, lumber manufacturing, the local building trades, the printing and publishing industry, sea food culture, scientific agriculture and horticulture for city boys, and miscellaneous local industries. There is a plan for co-operation with the United States navy in the training of naval machinists, engineers, etc., a study of the desirability of a department for negroes, and an account of responses obtained from labor unions. Related to the educational aspect of this vocational survey is an investigation now being made by the Division of Educational Research into the causes of the elimination of children from the public schools. The survey shows careful and painstaking study, and contains much material that will be of general interest beyond the confines of New Orleans.

The Johns Hopkins University announces the George Peabody Scholarship in the Department of Education, open to men and women who are residents of the southern and southwestern states of our Union. The income of the scholarship is two hundred and seventy dollars per annum. Applications must be filed before March 1, 1916.

Another step towards the creation of a teachers' college in Baltimore was taken in the recent establishment of the degree of Bachelor of Science in Education by the Johns Hopkins University. The curriculum leading to the new degree will be based on the college courses

for teachers and the summer courses. The degree will be open to men and women on equal terms. Professor Edward F. Buchner has been appointed director of the courses leading to the new degree.

At Teachers' College, George Washington University, a demonstration school was opened during the past year in Saint John's Church Orphanage. Classes for practice teaching are provided in all the grades of the elementary school. At the same institution practical work in the Binet tests was started during the past year in connection with the courses in laboratory psychology. This work will be extended next year, and the plan is to enlarge it into a psychological clinic.

The Harvard University Division of Education announces two courses in play and recreation, by Mr. George E. Johnson, formerly director of playgrounds, Pittsburgh, Pennsylvania, author of "Education Through Plays and Games" and other publications on play and recreation. One of these is a technical course for teachers, playground directors, and social workers, and will present opportunities for field work, practice and research. The other is a general course for all those interested in the play movement, and will present the biological, educational, and social aspects of the play, and the relation of play to the conservation of desirable racial characteristics, to growth, and to social institutions. Mr. Johnson will have the cooperation of Mr. Joseph Lee, president of the Playground Association of America, and of Dr. Joel E. Goldthwaite, lecturer on orthopedic surgery in the Graduate School of Medicine, Harvard University.

George Peabody College for Teachers has received $8,500 from Miss Eleanor Cuyler of New York City and Mr. Thos. DeWitt Cuyler of Philadelphia, for equipping the Jessup Psychology Laboratory. This amount of money is to be spent for furniture, laboratory equipment and psychological publications.—*Science.*

In the School of Education of the University of Pittsburgh the following extensions of work have been arranged for the coming academic year: Supervision of practice teaching will be required of all regular members of the faculty, first, in order to increase the amount and improve the quality of the supervision itself, and second, in order to bring the courses in educational theory into closer rela-

tions with the work of the student teachers and with the educational needs and conditions of the community. Dr. George Ellis Jones of Clark University has been secured to conduct courses in School Hygiene and in the Psychology of Industrial Education. Dr. Jones has made investigations in Tuberculosis among School Children and in Training in Education, and has recently been doing research work on Military Hygiene for the Carnegie Peace Foundation, in collaboration with Dr. Wm. H. Burnham.

The School of Childhood which has hitherto limited its training to children of Kindergarten age will broaden its scope to include the first two grades of the elementary school. Its problem is twofold; first, to work out the best type of training for children below school age; and, second, to unify the work of this early period with the work of the first two grades, thus eliminating the chasm which now exists very generally between the kindergarten and the primary grades. To conduct this enlarged experiment Miss Meredith Smith who has been studying and teaching in several departments of Teachers College for a number of years has been appointed Assistant Professor of Childhood Education and made head of the department of Childhood Education which includes the School of Childhood as its laboratory.

Special researches in the department of Educational Psychology, to be conducted by fellows in the department, include a study of border cases of mental defectives, the relation of fatigue to certain phenomena of adolescence in girls. For the first time a course is offered in "The Junior High School" in the Department of Secondary Education, by Dr. T. J. Kirby. This is a course dealing with the organization, curriculum, and principles of teaching which should obtain in a junior high school. It is a graduate course but open to advanced or experienced undergraduates.

The American Psychological Association held a joint meeting with Section H of the American Association for the Advancement of Science at San Francisco, August 3–6. The first meeting, on Mental Tests in Their Pedagogical Significance, was held in connection with Section L, Education, and the American Association for the Study of the Feeble-Minded. The following papers were presented: Lewis M. Terman, The Stanford Revision of the Binet Scale; Helen Thompson Woolley and Charlotte Rust Fischer, A New Scale of Mental and Physical Measurements for Adolescents and Some of its Uses;

Grace Helen Kent, A Graded Series of Geometrical Puzzles; L. W. Fike, Tests for Prospective Students of Stenography; Mrs. V. C. Hicks, Various Degrees of Success in Public School Training of Mental Defectives; Grace M. Fernald, Results of Tests with Specific Cases with Emphasis on the Study of the Delinquent Type; Olga L. Bridgman, The Result of Mental Tests upon Dependent and Delinquent Children in San Francisco. At other sessions of the Association, papers of interest to educational psychologists were presented as follows: W. B. Pillsbury, Some Investigations on Memory for Sense Material; George M. Stratton, Creative Imagination in Boys and Girls; Eleanor Rowland, Psychological Tests of Reed College Students; Henry H. Goddard, The Mental Hygiene of the Backward Child; Edgar A. Doll, Prognostic Value of the Binet Tests; A. J. Rosanoff, Evaluation of Reactions in an Association Test Designed for the Purpose of Higher Mental Measurements; Robert M. Yerkes, Methods of Studying Ideational Behavior in Man and Other Animals; L. R. Geissler, Group Experiments and Introspective Exercises in Class Room Work; L. W. Sackett, Some Aspects of the Problem of Sequence of Subjects in Beginner's Psychology; Daniel Starch, The Measurement of Ability in English Grammar; J. E. W. Wallin, Age Norms of Psycho-motor Capacity.

At the San Francisco meeting of Section L, Education, American Association for the Advancement of Science, in addition to the joint session with the American Psychological Association, the following papers were presented: William Kent, Elements in the Teaching of Writing; William T. Foster, Reed College System of Scientific Grading and Credit for Quality; Walter B. Swift, Management of the Speech Defect Problem in the Public Schools; Paul H. Hanus, Measuring Progress in Latin; L. W. Sackett, Measuring a School System by the Buckingham Spelling Scale; L. B. Sears, Spelling Efficiency in the Oakland Schools; L. Edgar Coover, Formal Discipline; Edward K. Strong, Jr., Some Notes on the Learning of Arithmetic; and David Spence Hill, Survey of Industries in Mechanical Occupations in New Orleans by the Division of Educational Research.

Among the papers presented at the Eighth Congress of the American School Hygene Association at San Francisco the following are of interest to educational psychologists: W. H. Burnham, A Health Examination at School Entrance; Guy S. Millberry, The Education

of the Child in Oral Hygiene; Samuel G. Dixon, Some Results of the Health Inspection of 400,000 Rural School Children in Pennsylvania; Frederick L. Hoffman, Statistical Evidence of Physical Progress or Deterioration of School Children; Walter S. Cornell, A System of Sanitary School Inspection with Graded Standards and Exact Rating of School Buildings; W. F. Snow, The School and the Social Hygene Movement; C. E. Rugh, The Educational Basis for Sex Instruction; and H. H. Goddard, The Hygiene Value of Grading a School According to the Intelligence of the Pupils.

Mr. George Eastman, president of the Eastman Kodak Company, is to build for the city of Rochester at a cost of about $300,000 a free dental dispensary. Announcement of the gift was made at a meeting of the Rochester Dental Society, which for years has maintained free dental dispensaries in the public schools. —*School and Society.*

The governor of Indiana has appointed a commission to investigate the causes and prevention of mental deficiency in the state. The commission includes the superintendents of two state hospitals, the dean of the Indiana University School of Medicine, the superintendent of the Indiana Village for Epileptics, and the superintendent of the State School for Feeble-Minded Youths.

When the University of Oregon opens in the fall, it will undergo two "surveys." Dr. S. P. Capen, the government specialist in higher education, as official representative of the United States Bureau of Education, will be brought to the campus, probably early in October, and will remain until he is sure that he understands every phase of the University's activities. Then he will make a detailed report on its work. The other survey was ordered by the last session of the legislature for the guidance of the next session, and will be conducted by a joint committee of two houses. Its emphasis will probably be financial rather than educational.—*School and Society.*

Professor G. M. Whipple of the University of Illinois delivered at the University of Pittsburgh, August 16–21, a series of special lectures upon mental tests, mental heredity, exceptional children, efficiency in studying, and other topics in educational psychology.

A series of four public lectures on the Psychology of Music were given this summer at the Harvard Summer Session by Dr. Christian A. Ruckmich, associate in psychology at the University of Illinois. The subjects included: Some Psychological Aspects of the Origin of Primitive Music, Rhythm and Eurhythmics, the Memory of Absolute Pitch, and Psychological Tests of Musical Ability.

Herbert Lee, M. A., University of London, now principal of the high school at Oxnard, California, has been appointed principal of the university high school in Oakland, California, toward the support of which, as a training school for practice teaching by the candidates for a high-school teachers' certificate, the University of California will hereafter make a grant of $10,000 per annum, the Oakland school department defraying the remainder of the expense of the school. Charles E. Rugh, professor of education in the University of California, will serve as director of the school.—*School and Society.*

At the University of Pittsburgh the following appointments in the School of Education are announced for the coming academic year: George Ellis Jones, A. M., Ph. D. (Clark 1913, 1915), of Clark University, assistant professor of education; Miss Meredith Smith, B. S., A. M. (Columbia 1914, 1915), of Teachers College, Columbia University, assistant professor of childhood education; Miss Marguerite L. McLean, A. B., M. S. (Wisconsin, 1907; Columbia, 1915), of Teachers College, Columbia University, assistant professor of household economy. Miss McLean was formerly a member of the faculty but for the past two years has been doing graduate work in Teachers College. In the same school the following promotions have been made: Gardner Cheney Basset, Ph. D., from assistant professor to professor of educational psychology and director of the psychological clinic; Cecil Kenyon Lyans, Ph. D., from instructor to assistant professor of the history of education; Thomas William Burckhalter, B. S., M. P. E., from instructor to assistant professor of physical education; Miss Adele May Jones, B. S., from instructor to assistant professor of household economy; Miss Mary Gloyd Waite, B. S., from instructor to assistant professor of childhood education.

In the school of education of the University of Pennsylvania, Ambrose L. Suhrie and Arthur L. Jones have been elected assistant professors of education. Mr. Suhrie was graduated from the Pennsyl-

MICHIGAN STATE NORMAL COLLEGE
TRAINING SCHOOL DEPARTMENT.

vania State Normal School at California in 1900, and from the John B. Stetson University in Florida in 1906. From 1906 to 1910 he was professor of education and principal of the Normal College at Stetson University. In the latter year he became Harrison fellow in education at the University of Pennsylvania and received the degree of Ph. D. in 1913. In 1914 he went to the State Normal School at West Chester, Pennsylvania, as professor and dean of the department of education. Mr. Jones was graduated in 1893 from Iowa College at Grinnell, and for two years remained there as an instructor in biology. In 1895 he became instructor in biology in the Minneapolis High School, and two years later became superintendent of schools at Redwood Falls, Minnesota. After several years of service, he resigned to take graduate work in education at Columbia University, where he held a fellowship for three years. In 1907 he was elected professor of education at the Rhode Island Normal School at Providence; he was called in 1911 to the chair and departmental headship in education at the University of Maine.—*School and Society.*

Professor H. H. Foster, Ottawa University, Ottawa, Kansas, has accepted the position of head of the department of education in the University of Arizona.

At the University of Washington Dallas D. Johnson, director of the training school at the State Normal College, Bowling Green, Ohio, has been named assistant professor of education to succeed Professor J. K. Hart, who will be on leave of absence next year, and who is not expected to return to the university.—*School and Society.*

Dr. F. K. Sechrist, who received his doctorate from Clark University in 1913, has been appointed instructor in primary education in the University of Cincinnati College for Teachers. Miss Frances Jenkins, assistant editor of the Riverside Readers, has also been added to the faculty as supervisor of elementary grades and instructor in methods.—*School and Society.*

Dr. F. J. Kelly, director of the training school of the Kansas State Normal School, at Emporia, has been appointed dean of the school of education of the University of Kansas. He will retain both positions for the present. The double appointment is considered an important step toward unifying the teacher training system of the

state. Dr. Kelly graduated from the University of Nebraska in 1912, and took his doctorate at Columbia in 1914. During the years 1902 to 1908 he held positions of various types in the public schools of South Dakota. From 1908 to 1912 he was director of the Normal Training School at Spearfish, S. Dak. Dr. Kelly has done work on standardizing grades and on tests of silent reading.—*School and Society.*

William Webb Kemp, a graduate of Stanford and Ph. D. of Columbia, now professor of education in the University of Montana, has been appointed professor of school administration in the University of California.—*School and Society.*

Dr. Joseph Peterson, who recently resigned his professorship in the University of Utah, has been appointed professorial lecturer in psychology at the University of Minnesota.—*Psychological Bulletin.*

Frederick M. Gerlach, A. M., has been appointed instructor in psychology and education in Colorado College, and will be in charge of the experimental work in these subjects.—*Psychological Bulletin.*

Richard M. Elliott, Ph. D., instructor in psychology in Harvard College, has been appointed instructor in psychology in Yale University.—*Psychological Bulletin.*

Herschel T. Manuel has been appointed instructor in psychology and pedagogy at Clark College.—*School and Society.*

CURRENT PERIODICALS

PEDAGOGICAL SEMINARY. Vol. XXI, No. 4, December, 1914. EDWARD L. THORNDIKE. *Measurements of Ability to Solve Arithmetical Problems.* 495–503. Four simple arithmetical problems were presented to 4500 pupils of Grades 6–9 in Massachusetts schools. The pupils were given exactly ten minutes on each problem. The chief purpose of the experiment was to determine precisely how these problems compared in difficulty. This was done by comparing the percentages of correct solutions in ten minutes. Incidentally it was found that in the more difficult problems the boys were markedly superior to the girls, but as the problems grow easier this disparity decreases until on the easiest the disparity is slight. The younger children in each grade make better scores than the older children.

HARRIS L. LATHAM. *A Study of Falsehood.* 504–522. This is rather a study of the precise significance of the terms by which various aspects or shades of falsehood are characterized.

RUDOLF PINTNER. *One Hundred Juvenile Delinquents Tested by the Binet Scale.* 523–531. Of the sixty-three boys and thirty-seven girls tested in the Columbus Detention Home 46 per cent. were feeble-minded, *i. e.*, three or more years retarded. This is in accord with the results of several other investigations cited by the author. A large part of juvenile crime seems to be chargeable to stupidity.

ISIDORE KAYFETZ. *A Critical Study of the Hillegas Composition Scale.* 559–577. The author proposes "to determine the scientific validity of the [Hillegas] scale and its applicability for administrative and pedagogical purposes." To do this he gives a fairly complete account of the way in which the scale was constructed, quotes freely from Dall, Johnson, and other critics of the scale, compares one sample with the original from Washington Irving, and concludes that "the scale is wholly unsatisfactory and invalid from the scientific point of view for the following reasons: (1) The methods used in deriving the scale are faulty. They are purely statistical and not experimental-pedagogical. (2) The scale is not really an objective one, because it was derived by a statistical study of subjective data-opinions. (3) The judges determined the qualities of the compositions according to expert literary standards, not according to pedagogical standards. (4) The study was defective in its mode of procedure in that it lacked a preliminary series. (5) The selections in the scale do not represent real children's expression. (6) The scale regards the composition work of pupils merely from the standpoint of the result." [How much such criticism is worth must be left to the judgment of the intelligent reader.]

WILLIAM E. BOHN. *First Steps in Verbal Expression.* 578–595. A study of a girl's development in speech from the ninth to the twenty-

sixth month. The total number of words at 12 months was 7, at 18 months 207, at 24 months 657, and at 27 months 969. The detailed vocabulary is given month by month.

ROBERT BENNETT BEAN. *The Eruption of the Teeth as a Physiological Standard for Testing Development.* 596–614. A comparative study of 817 American children, 628 children of German extraction, and 776 Filipino children. The author gives the beginning and end of the eruptive period for each type of teeth for each of the three groups, listing boys and girls separately. The Americans and Germans stand close together, the Filipinos are more precocious. The time is then calculated at which approximately fifty per cent. of each type of tooth is erupted. There is a study of the relation between morphologic form and teeth, a consideration of the physiological standard, and an indication of the modal grade for each age. The author concludes that "no single factor, such as stature, or weight or the epiphises of the bones, or the eruption of the teeth, or the presence or absence of secondary sexual characters, or any other factor, will be sufficient alone to establish the relative development of the individual."

Vol. XXII, No. 1, March, 1915. MARGARET MORSE NICE. *The Development of a Child's Vocabulary in Relation to Environment.* 35–64. This little girl uttered her first words in her 14th month. At 18 months her vocabulary contained 145 words, at three years 1205 words, and at four years 1870 words. The detailed vocabularies are given at each period, the results are tabulated according to parts of speech and difficulties of pronunciation, and the nouns are classified according to personal experiences, indoor environment, outdoor environment, people, pictures and stories, and abstract words.

MILDRED LANGENBECK. *A Study of a Five-Year-Old Child.* 65–88. At sixteen months this little girl had a vocabulary of 229 words, and at five years she had increased it to the remarkable number of 6837 words. Her mental age at five years, as indicated by the Binet tests, was eleven. The detailed vocabulary is given, and while the large number is due in part to the fact that each distinct meaning is counted as a separate word, *e. g.*, switch (n., tracks), switch (n., stick), switch (v.), the variety and quality of the words given amply attest the child's precocious development.

GEORGE C. BRANDENBURG. *The Language of a Three-Year-Old Child.* 89–120. Contains the vocabulary of 2282 words, a discussion of the child's speech development, and a complete record of her conversation for an entire day. The total number of words in the latter was 11,623, and the number of different words used was 859. The author produces evidence to show that playing with other children had a retarding rather than an accelerating effect upon this child's linguistic development.

ALICE C. HINCKLEY. *A Cause of Retarded Speech Development.* 121–146. A detailed study of the number and quality of errors of a

girl five and one-half years old who had previously suffered from adenoids, inco-ordination of movement, and protruding lower jaw.

No. 2, June, 1915. JOSEPH K. FOLSOM. *The Scientific Play World of a Child.* 161–182. An account, by a university student, of the complicated and highly systematized imaginary world of a child between the ages of five and eleven.

JAMES RICHARD GRANT. *A Child's Vocabulary and Its Growth.* 183–203. A study of the increase in a girl's vocabulary month by month from the twelfth (3 words) to the twenty-sixth month (1201 words). The complete vocabularies are given, there is a valuable comparative table of all vocabularies that have been reported of children from one to six years of age, and some interesting observations are made on phases of linguistic growth.

CHARLES B. LEWIS. *Etiology of Scoliosis.* 218–251. A summary of 121 discussions of lateral curvature of the spine, and a report of the author's examination of 1100 boys in the Worcester high schools. There is a detailed tabulation of the results of this examination, and the author makes a number of practical hygienic suggestions.

JEAN DAWSON. *Measuring the End-Product.* 290–295. Tests of high school graduates in the normal school show failure to recognize and discriminate common trees, plants, and weeds, to locate accurately ten important city buildings, or to locate familiar shops and theatres, so that a stranger could find them without difficulty. For these failures the author apparently holds the high schools responsible.

No. 3, September, 1915. FRANCIS LEE DUNHAM. *Somatic Development, a Criterion of Mental Measurement.* 305–325. Proposes the term "somatic development" in place of such terms as "anatomical age," "physiological age," etc., analyzes the facts of growth from the embryological and physical points of view, and discusses periods of growth, influence of ductless glands, development of the nervous system, pubescence, and the development of the teeth and of the osseous system.

EMERY L. KUHNES. *Experimental Study of Dynamic Periodicity as Influenced by Diurnal, Weekly, Monthly, Seasonal and Yearly Efficiency.* 326–346. A study in the records obtained from the use of the Smedley dynamometer for 560 days. Six measurements, three with either hand, were taken at seven stated times daily, and the subjects included, at different times, 12 students in addition to the author. There is a distinct diurnal course of efficiency, and a seasonal periodicity, but no weekly or monthly variation.

W. F. TIDYMAN. *A Critical Study of Rice's Investigation of Spelling Efficiency.* 391–400. A sweeping condemnation of Rice's procedure and interpretation of results. "The investigation offers little of direct, positive value to pedagogical theory and practice. Its greatest, and, indeed, its monumental service to education must be that it raised questions and stimulated experimentation and criticism of existing practices."

PUBLICATIONS RECEIVED

(Notice in this section does not preclude a more extended review.)

A Comparative Study of the Salaries of Teachers and School Officers. Bulletin No. 658. Washington: Bureau of Education, 1915. Pp. 126.

There is a discussion of the increased cost of living and its effects upon teachers, a comparison of the earnings of school workers with earnings in other occupations, a comparison of teachers' salaries with other school expenses, suggestions for conducting campaigns to increase salaries, and a special study of the salaries of elementary teachers.

MEYER BLOOMFIELD. *Youth, School, and Vocation.* Boston: Houghton Mifflin Company, 1915. Pp. xi, 273. $1.25 net.

This is a statistical and administrative study of vocational guidance, not a psychological investigation. In the introduction President Suzzallo calls attention to the fact that the schools have always striven to prepare a selected few of the pupils for their life work, and states that the new idea is to extend this fostering care to the many. The complexity and increasing specialization of modern industry make the choice of a life-work a difficult matter, and in all too many instances the boy or girl blunders along without definite thought for the future. The author gives convincing evidence of the waste involved in such a procedure, describes the Boston Vocation Bureau, the Cincinnati, Newton, and other plans for meeting the needs of young people, presents in detail the organization of the work in Boston, and discusses vocational guidance in Germany and England. There are also chapters on health guidance and on the start in life, and the appendix contains almost 100 pages of "suggestive material."

ARTHUR CLIFTON BOYCE. *Methods for Measuring Teachers' Efficiency.* The Fourteenth Yearbook of the National Society for the Study of Education. Part II. Chicago: The University of Chicago Press, 1915. Pp. 83. 79c.

Chapter I presents a summary of current methods of measuring teaching efficiency in 242 cities of over 10,000 population. In 14 cities promotional examinations are held; in all the others teachers are promoted on the basis of some sort of rating of their teaching. Chapter II discusses studies that have been made as to the qualities of merit in teaching. Control and teaching skill rank highest, while

health and personal appearance stand at the lower end of the scale. In chapter III the author presents his "efficiency record,"—the scheme of points on which he believes teachers should be rated,—and in chapter IV he gives a number of illustrations of the use of the method, and discusses those points of the scheme that might become the object of criticism. Chapter V contains a statistical determination of the relative importance of qualities of merit, and chapter VI is a general summary. In the appendix is found the revised form of Elliott's score card, and the score card that was used in the Ohio survey.

FRANK PIERREPONT GRAVES. *A Student's History of Education.* New York: The Macmillan Company, 1915. Pp. xxvii, 453. $1.25.

The author states in the preface that this book is not a mere condensation of his three volume work but has been written from the point of view of omitting theoretical and philosophical material and stressing the actual practices of education as an outgrowth of the life of the time. Another feature of the book is the condensation of the history of ancient and medieval education into the briefest compass consistent with a clear understanding of the important movements of those periods, and the allotment of over half the space to the educational developments of the past two centuries. There is an interesting chapter on formal discipline in which it is shown that the theory did not originate with Locke (except in his argument for mathematics Locke seems rather opposed to it) but rather goes back to the faculty psychology developed from Aristotle. There are chapters on the development of industrial education, on the psychological systems of Herbart and Froebel, on the growth of modern secondary education, and on the scientific movement in education, including scales of measurement and school surveys. The style is clear and attractive, and the author's aim, to afford the student a historical orientation with respect to the educational problems of his own time, has been admirably realized.

CHARLES W. HALE. *Domestic Science, Part I.* Cambridge: University Press. New York: G. P. Putnam's Sons, 1915. Pp. xi, 327. 90c.

The title of this book would seem to an American to be strangely misleading. It is true that in the preface the author gives warning that he proposes to emphasize the strictly scientific aspect of the "somewhat ill-defined subject known as domestic science," but for all that a casual inspection can reveal the discussion is as closely related to bridge building or the manufacture of liquid air as to anything that goes on in the home. There is a series of learned discussions on measurements of length, area, volume and weight, the con-

stitution of matter, work, power and energy, heat, air, oxygen, and the physical and chemical properties of water. It is an introductory work on physics and chemistry of the most formal type, and even the 145 experiments have nothing in them that pertains to the household. Such an unpsychological and unpedagogical treatment of any science cannot be too strongly condemned, for it defeats the fundamental purpose of all science instruction—the awakening of a lively interest in the subject discussed. It is to be hoped that the book may have some success in its avowed purpose of enabling English students to pass certain examinations, but it is more fervently to be hoped that we may forever be spared the need of such formal aids in this country.

JAMES S. HIATT. *The Truant Problem and the Parental School.* Bulletin No. 656. Washington: Bureau of Education, 1915. Pp. 35.

This monograph reports a study of 100 typical cases of truancy in Philadelphia from the points of view of nationality, age, sex, progress in school, mentality and home surroundings, and a survey of parental schools in thirteen cities with reference to their plant, maintenance, staff, curriculum, discipline and after care.

ELLA GILBERT IVES. *The Evolution of a Teacher.* Boston: The Pilgrim Press, 1915. Pp. xiv, 188. $1.00 n.

A somewhat impressionistic, emotional autobiography presenting glimpses of Chicago at the time of the fire and Boston in the days of Phillips Brooks. There is no doubt about the religious earnestness of the writer, but the book would be much more satisfactory if the aura of religious emotionalism had been held in check by a passion for an accurate account of the writer's experiences.

FRANCES JENKINS. *Reading in the Primary Grades.* Boston: Houghton Mifflin Company, 1915. Pp. xi, 125. 60c.

The editor, in his introduction, after emphasizing the importance of reading in modern education as a means of unlocking thought for the child, says, "The monograph here presented bears on the problem of teaching primary children to read, a field where dullness has hitherto reigned. It is offered as a set of concrete, practical suggestions which the teacher may follow in the faith that it has the best of modern investigation behind its selection of methods." Chapter I contains interesting devices for training children to pick out the essential thought of the paragraph or passage read. In chapter 2, on problems of expression, the author emphasizes the need for training the child to know what good reading is and to evaluate his own reading and determine what is wrong with it. The remaining chapters deal with form mastery, special methods, the recitation period, the study period, and the teacher's attitude toward results.

CHARLES HUBBARD JUDD. *Psychology of High School Subjects.* Boston: Ginn and Company, 1915. Pp. ix, 515.

In this book the author breaks new ground, and sows the seed which in due time will bring forth the harvest of a reorganization of secondary school work upon the basis of the social and psychological needs of the pupils rather than upon tradition and prejudice. But before this day of harvest arrives much more experimental investigation will be needed than is now at the disposal of the author, and many of the statements here set forth will have become the objects of acrimonious discussion. Criticism, however, is what the author expects and invites, and, if it advances the cause of a psychological outlook on secondary education, he will be one of the first to rejoice. In two respects the book is somewhat disappointing: First, it is made up to a large extent of extracts from the writings of others, and, second, the chapters have no bibliographical references (other than citations of the sources of quotations) to afford students an orientation in the related literature. At times its tone is that of a polemic rather than of a scientific and dispassionate presentation of facts, but this only makes it more interesting and more likely to stir up controversy. In considering the specific high school subjects the author's general plan is to examine representative textbooks to discover the psychological development expected of the pupil, to analyze the statements made by writers on the methodology of the subject, and to appeal to observation in the classroom for evidence as to the actual mental behavior of pupils. The first six chapters are devoted to high school mathematics, then follow four chapters on language (including composition, English literature, and foreign languages), four on manual arts, industrial courses and science, one each on fine arts, history, generalization, and teaching how to study, and a final chapter on general problems of secondary education. It is a noteworthy book, and should receive careful consideration.

JOSEPH LEE. *Play in Education.* New York: The Macmillan Company, 1915. Pp. xxiii, 500. $1.50.

It is refreshing to find a writer in these modern days who tells you at the start that he cares little for the practical. "My aim in this book is to present a true picture of the child. . . . The practical conclusions reached—though, like any conclusions upon this subject, they are important if sound—are of secondary interest." At the outset the reader is warned that the term play is to be used in a broad sense to cover practically all the child's activities, and the author voices his vexation that play usually carries the connotation of the opposite of work. Unfortunately, the sharp differentiation between instinct and reason smacks of a psychology that has little in common with recent studies of instinct and reason. The work is divided into five books, and contains forty-eight chapters. Book

one develops the thesis that play is growth, and expounds a general theory of play instincts. In the remaining four books the author describes the activities of what he considers the four ages of childhood: Babyhood, from one to three; the dramatic age, from three to six; "Big Injun age," from six to eleven; and the "age of Loyalty," from eleven on. Every chapter contains interesting material for reflection, although the initial conception of instinct leads to statements that are irritating to the critical student of child behavior.

ANNA M. LÜTKENHAUS. *Plays for School Children.* New York: The Century Company, 1915. Pp. xix, 283. $1.25 net.

A collection of dramatic plays adapted for presentations by elementary school children. It includes "Master Skylark," introducing Shakespeare and his contemporaries, "Barnaby Lee," representing old New York in Stuyvesant's day, "Through the Looking Glass," from Alice in Wonderland, "Lady of the Lake," "Thanksgiving Day —1696," "Four Queens of England" (Elizabeth, Mary, Anne and Victoria), and fifteen other plays adapted from various sources, or constructed for special occasions. The book is a valuable addition to the increasing dramatic literature for schools.

THEODORE L. MACDOWELL. *State versus Local Control of Elementary Education.* Bulletin No. 649. Washington: Bureau of Education, 1915. Pp. 83.

"All States in the Union maintain systems of public schools, and in every State support and control of schools are divided between the State and local communities—county, township, district, municipality. In no two States is this division the same." The author has performed a valuable service in collating the scattered data on distribution of State school funds, restrictions upon their use, State aid, the rights of localities to borrow money and issue bonds, regulations of taxation, and State intervention in the local control of school affairs.

A. S. MACKENZIE. *The Evolution of Literature.* Thomas Y. Crowell Company, 1915. Pp. xvii, 440. $1.50 net.

This is the second edition of a very interesting book on comparative literature. The author's point of view is anthropological and psychological, rather than strictly literary, and the book represents an effort to get at the common origins of literary expression. The earlier chapters deal with primitive man and the primitive literatures of Africa, Oceania, Asia, and America. The author then considers primitive art, early forms of the dance and drama, the primitive lyric, and primitive narration. The next seven chapters discuss barbaric literature in representative lands and its different forms.

Two chapters are devoted to autocratic literature, as found in Babylon, India, Egypt and Greece, and the remaining three chapters deal with democratic literature in Europe and America. The treatment of the material is novel and stimulating throughout.

MARTHA MACLEAR. *The Kindergarten and the Montessori Method.* Boston: Richard G. Badger, 1915. Pp. 114. $1.00.

The sub-title of this book is "An Attempt at Synthesis." It is a brief treatise, based on genetic psychology, of the problems needing adjustment in this phase of education. It is written from the viewpoint of a teacher of the kindergarten and a close student of Montessori, but of one who has also had experience in other lines of educational work. The author urges that the kindergarten adopt Montessori's two fundamental principles of liberty and education founded on the spontaneous activities of the child. She pleads for "a general reversal of procedure, a complete change in methods and an addition to the material, as well as the discarding of much of the old material. . . . . We need teachers who are not wedded to any one system of thought but who are keen seekers of the truth. . . . . We need a changed curriculum in our training schools that we may turn out teachers who are capable of bringing the kindergarten into line with the best educational thought." The book is well constructed and should be carefully studied by primary teachers.

EUGENE F. MALOUBIER AND JUSTIN H. MOORE. *First Book in French.* New York: The Macmillan Company, 1915. Pp. xiii, 363. $1.10.

This book is constructed on the traditional lines of first year language books,—detached sentences, vocabulary, questions to be answered in French, grammatical rules and composition exercises. In endeavoring to compromise between the so-called "inductive and deductive methods" the authors fail to meet the needs of either those who wish to learn to speak French or of those who desire merely a reading knowledge of the language.

LOIS KIMBALL MATHEWS. *The Dean of Women.* Boston: Houghton Mifflin Company, 1915. Pp. ix, 275. $1.50 net.

A masterful discussion of practical problems in higher education of importance not only for those who are interested in the college life of women but for all those who are in any way connected with college administration. The author contends that the dean of women should have a Ph. D. degree, should have made contributions to some branch of academic learning, should have a limited amount of teaching to do, in order to keep in touch with the intellectual life of the students, should have a seat in the faculty and membership on important

faculty committees, should have sufficient personal charm and social *savoir faire* to enable her to be at ease in any social gathering and to make others feel at ease likewise, should be able to address an audience with confidence and vigor, and should establish such relations with women student organizations that her opinions and advice on any subject would be welcomed and listened to with respect. Among the topics dealt with are student employment, vocational guidance, student self-government, social life, student discipline, and the intellectual life of students. The author speaks from a background of rich experience, and her treatment of college problems is so sane, so broad-minded, so full of insight as to call forth the highest approval. If there were such things as reading circles in college faculties as among elementary school teachers (a thing which would vastly improve the discussions in faculty meetings) this book should head the list for the current year.

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W. G. SLEIGHT. *Educational Values and Methods Based on the Principles of the Training Process.* Oxford: At the Clarendon Press. New York: Oxford University Press, 1915. Pp. viii, 364. 4s. 6d. net.

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The author traces the history of public schools in Alabama from 1819 to 1914. He shows how the dependence of the people upon the income from federal grants weakened their sense of responsibility for the schools and left them inert and apathetic when that income failed. There is a good picture of the effects of plantation life upon the planters and upon the whites connected with the plantation, in regard to their attitude toward education. The latter part of the monograph is devoted to a consideration of the results of the war, and to the new outlook for public school education in Alabama.

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